The Chemical Age

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Future of Chemical Engineering

TOWARDS the close of the war, and, indeed, for some considerable period afterwards, it was a common taunt that we had no chemical engineers in this country. It was, of course, an exaggeration, as the achievements of British chemistry, especially in the heavy branches, had long before demonstrated, for chemical engineers, by whatever name they called themselves, had been responsible for setting up the necessary plant for these operations. But there was some truth in it also, which was evidenced by comparison with the state of chemical engineering in Germany, and by the difficulty experienced here when, for example, we had to set about the task of fixing atmospheric nitrogen for commercial purposes. As compared with Germany, which had already solved the problem, our task was largely that of merely repeating a German success. A somewhat similar situation arose when, knowing all about the theory of vat dyestuffs, we attempted their commercial production. Those comparatively distant years were full of difficulty. The difficulties are now things of the past. A new chemical engineering school has come into existence, and there is little in the new technique of chemical design and plant construction with which this country is not as competent to deal as any other. Some idea of the diversity of chemical engineering products may be gained from the numerous trade announcements in this issue. All this marks an enormous advance.

While on the past decade and a half one may look back with real satisfaction, the main concern relates to the future, for here, as in the United States, the coming competition will not be merely in the prices at which commodities are produced, but in the commodities themselves. Every new chemical product put on the market tends to displace the product that it supersedes, and the continual production of new commodities results in this new form of competition. Mr. S. J. Kirkpatrick, the editor of *Chemical and Metallurgical Engineering*, describes very well the conditions with which American chemical industry is confronted. "More than ever before" he points out, "is there the vital need not only for lower costs, but for accurate knowledge of product and ability to anticipate the market trends of business. For competition in chemical industry is not limited to the usual price, quality and delivery factors for the individual product. Often more important is the newer and more aggressive competition between commodities. A new synthetic displaces a natural material because it is available in quantity and at a lower price. Or it may possess more desirable properties that permit it to enter an entirely new market for which the older product was ill adapted. If it completely fills the new need and is reasonably priced, it wins a place for itself without direct competition. If, on the other hand, its only advantage is cost, it is likely to precipitate a price war that will end only with the displacement of the more costly material. The more constructive activity is that directed towards new and relatively non-competitive uses. Such subjects are of more than academic interest to the chemical engineer. There never was a time when more of his products were entering the world's market on a keenly competitive basis."

The situation thus opened up is one that cannot be completely met by mere technical efficiency, essential as that is. It calls for imagination to see a stage beyond what is immediately visible and to anticipate not only the needs of industry to-day, but the needs of to-morrow and the day after. The new process, the new plant, the new constructional material, and most important of all, the new product that better meets the needs of industry—these will determine the measure of success for the future. Here, for the chemical engineer, lies an ever-widening field in which, while satisfying the demands of the present, the eye is also on the future, searching for the new opportunities that are always arising in chemical industry. This country is to be congratulated on the virility of its new chemical engineering science, using that term in its largest sense, as comprehending theory, process, plant and production, for it is upon the application of this science to industry that the future depends.

A Move towards Economy

THE great City demonstration at the Cannon Street Hotel on Tuesday, organised by "The Friends of Economy," was described by Sir Ernest Benn as the beginning, not the end, of a national economy campaign. If the end is as successful as the beginning on Tuesday, the nation will be grateful to the promoters for starting a movement for the financial and commercial salvation of the country. The influential and representative attendance, the swift response that the City made to the appeal for action, testified to the growing anxiety felt concerning the lavish way in which public money is being squandered. The promoters could not have wished for a fuller endorsement of their policy, and it is to be hoped that the movement thus started in favour of public economy will soon reach national proportions. It represents the only line that leads to national recovery.

Lord Grey of Fallodon rendered a signal service to the cause by emerging from his partial retirement to give a national lead. His reappearance was welcome for his fine qualities of character and mind. He stands almost alone as the survivor of a class of statesmen that, unhappily, has almost disappeared, and his direct and simple speech brought back something of the spirit of directness and sincerity that is so lamentably lacking in present-day politics. There was one striking contrast with which he opened. The great issues that distinguished his own time as a responsible statesman were issues of principle, not associated with money or its expenditure. The distinguishing feature of politics of late has been the rivalry of all parties to capture votes on a policy of spending money on so-called social services. It was a real service to point out this distinction to the country, and not less serviceable was his closing demand that for the immediate future the test question must be not whether expenditure was for good objects but whether the nation could afford it. If the meeting brings that principle home to politicians of all parties it will have done a fine national work.

The succeeding speakers, Sir Robert Horne and Sir Ernest Benn, admirably followed up the case stated by Lord Grey. Sir Robert Horne, himself a former Chancellor of the Exchequer, emphasised the danger of exhausting the country's capital and treating it from year to year merely as revenue. "If," he declared pointedly, "we do not end our present extravagance, it will end us." To that, we are sure, every member of the chemical industry will heartily subscribe. Sir Ernest Benn fittingly concluded the case for national economy with incisive and striking words of the kind that has done so much to arrest public attention in his sayings and writings. One point in particular deserves to be emphasised for its economic soundness. The one function of money, he said, was to expedite the interchange of goods and services. When money was used instead to buy votes or make peace, and nothing was received in exchange, the medium on which all trade relied was robbed of its essential qualities by the introduction into the market of debased political currency. This great meeting is to be followed up by active organisation. We are sure the chemical industry, with all the other industries of the country, will give the movement its warmest support.

A B.B. Trade Mission

ON Monday next Mr. John Benn, representing all the journals published by Benn Brothers, Ltd., will leave Southampton on a trade mission to South America, in connection with the British Trade Exhibition to be opened at Buenos Aires by the Prince of Wales on March 14. Quite a number of enterprising British chemical firms will be among the exhibitors, and in addition to notes on their exhibits arrangements have been made for the distribution of THE CHEMICAL AGE (including the present issue) and its associated journals on the stands and among potential traders. Throughout a period of six weeks (March 7 to April 11) a large number of Benn journals and other publications will reach exhibitors and traders at the Exhibition weekly and will be on view on the stands. Mr. John Benn will act as our special correspondent on this occasion, and his articles on the chemical features of the Exhibition and the trading prospects throughout South America should be of great interest. There will, during the period of the Exhibition, be a large attendance of British business men, and the Benn journals will altogether furnish exceptional means of effective publicity concerning British products for use in the great areas of South America.

The Calendar

Feb.		
2	Society of Chemical Industry (London Section): Joint meeting with the Faraday Society and the Chemical Engineering Group: "Specific Activation of Catalysts." Dr. E. B. Maxted. "Specific Surfaces." Dr. E. K. Rideal. 8 p.m.	Burlington House, Piccadilly, London.
2	University of Birmingham Chemical Society: "Problems of Photo-Synthesis." Professor W. Stiles. 5.30 p.m.	University, Birmingham.
4	Society of Public Analysts: Papers by L. H. Lampitt, J. H. Bushill, S. Marks, R. S. Morrell, A. van Raalte, H. R. Ambler, R. Bhattacharya, and T. P. Hilditch. 8 p.m.	Burlington House, Piccadilly, London.
4	Royal Society of Arts: "The Effect of Standardisation on Engineering Progress." C. le Maistre. 8 p.m.	John Street, Adelphi, London.
5	Chemical Society. 8 p.m.	Burlington House, Piccadilly, London.
5	Society of Chemical Industry (Bristol Section): "Recent Development in the Economic Production of Steam from Factory Boiler Plants," Joint Meeting with Institute of Fuel. M. Harman Lewis. 7.30 p.m.	University, Bristol.
5	Institute of Fuel: Joint Meeting with the Society of Chemical Industry: "Recent Developments in Economy of Fuel for Small Boilers." M. Harman Lewis. 7.30 p.m.	University, Bristol.
5	Society of Chemical Industry (South Wales Section): "The Microstructure of Coal." C. A. Seyler. (Joint Meeting with the Microscopical Society of Wales.) 7.30 p.m.	Technical College, Cardiff.
6	Society of Chemical Industry (Manchester Section): "Plant Used in the Manufacture of Synthetic Resins." A. Fraser. "The Effect of Certain Factors upon the Electrical Properties of Moulding Powder and Synthetic Resins." Dr. E. E. Walker and E. A. Bevan.	Manchester.
6	Oil and Colour Chemists' Association (Manchester Section): Members' Evening. 7 p.m.	Milton Hall, Deansgate, Manchester.

Melchett Medal for Fuel Research

Presentation to Dr. Kurt Rummel

THE first presentation of the Melchett Medal for Fuel Research took place on Friday, January 23, at the Institution of Civil Engineers, London. The recipient was Dr. Kurt Rummel, Principal of the Heat Economy Bureau, Düsseldorf, and the presentation was made by Sir D. Milne-Watson, president of the Institute of Fuel. The medal was instituted by the late Lord Melchett, first president of the institute, who provided a sum sufficient to endow the annual award in perpetuity. He made the condition that the award should be made, without restriction of nationality, to the person who " in the opinion of the Council has done either original research, or professional, administrative, or constructive work of an outstanding character, involving the scientific preparation or use of fuel, provided the results of such work have been made available within recent date for the benefit of the community."

SIR D. MILNE-WATSON PRESENTING THE MELCHETT MEDAL TO DR. RUMMEL.

The medal, which is in bronze, shows a figure intended to typify man as the medium by which the heat in coal can be transformed into power.

The Presentation

In making the presentation, Sir D. Milne-Watson paid a tribute to the late Lord Melchett for his great services to the fuel industry, and at his suggestion the meeting silently carried a vote of condolence with the family. The council, he said, considered that there was no one more worthy to receive the first medal than Dr. Rummel, who, when the German iron and steel industry was labouring under great difficulties in 1918-19, founded the organisation at Düsseldorf for the purpose of reducing fuel costs. To-day that institution employed no fewer than 1,000 fuel technologists. It had made great advances in the economical use of fuel for the iron and steel industry. As a result, in Germany the average costs of fuel in the iron and steel industry had been reduced by 15 per cent. Dr. Rummel had set an example for the whole world to follow, for he had never kept his scientific knowledge to himself. International friendships could be greatly fostered by the scientific work of men like Dr. Rummel. (Cheers.)

Dr. Rummel said he was grateful for the honour conferred on him. It was one which he could not accept for himself alone, but he would accept it jointly for himself and for his colleagues in Germany as representative of the new type of fuel engineer which had evolved in modern industrial, commercial, economical, and scientific development. He subsequently delivered the Melchett Lecture on " The Calculation of the Thermal Characteristics of Regenerators."

Dr. C. H. Lander, Director of Fuel Research under the Department of Scientific and Industrial Research, in proposing a vote of thanks, said he thought they should congratulate German industry on having a man like Dr. Rummel to solve its problems, and Dr. Rummel should also be congratulated on having an industry which applied scientific results when these had been obtained.

The Melchett Lecture

Dr. Rummel's lecture was a very thorough study in the mathematics of the subject, with numerous charts. In his introduction Dr. Rummel stated that the calculation of regenerators (*i.e.*, for open hearth furnaces and blast furnace stoves) presents a problem which cannot yet be solved on a basis of exact mathematical principles. The fundamental differential equations can, it is true, be formulated, but mathematicians have not yet undertaken their solution. Even so, were this task undertaken, it is probable that the calculation of regenerators from these formulæ would be too cumbersome to justify the general application of this method of calculation to actual practice. The numerous approximate solutions published in the international literature also have the disadvantage of being of a too complicated nature and would require at least a thorough scientific study of the subject, for which, however, the practical engineer generally cannot spare the time and, very often, does not possess the necessary mathematical training.

Realising the importance of the problems of air and gas preheat in metallurgical processes, the " Wärmestelle " (Institute of Heat Economy), Düsseldorf, decided to investigate the process of heat transfer in regenerators, in order to evolve a simplified method of calculation, but of sufficient accuracy to meet practical requirements and to determine at the same time the numerous co-efficients appearing in the formulated equations.

An experimental regenerator was erected three years ago with the financial help of the " Notgemeinschaft der deutschen Wissenschaft (Emergency Society of German Science), and the assistance of the United Steel Works, Ruhrort-Meiderich," with a checker-filling of 2×2 m. in cross-sectional area and 5·5 m. in height. Measurements of temperature and resistance to flow were taken on different types of checkers, and under varying conditions of operation. Up to the present, staggered and straight-flow checker-filling has been investigated; further tests are now being carried out with " solid chimney checkers," as used for blast furnace stoves. Special thanks are due to Dr. Lent, Dr. Kofler, Dr. Schack, Dr. Kistner, Dr. Schumacher, Messrs. Gross and Schefels, for their assistance in carrying out the difficult investigation and the computation of the results.

The general results of the calculations and tests were summarised first. In the mathematical deductions the following items, it was explained, had not been taken into consideration: The external losses of the regenerator-chamber, as well as the heating surface and brick-volume of the chamber walls and flues; the two errors would probably compensate each other to a large extent. Variations in the values obtained in practice from those calculated may also be caused by retarded combustion or other chemical reactions (dissociation of gases), leakage between air and gas chambers, unequal flow over the cross-sectional area of the checkers, irregular distribution of the waste gases to air and gas regenerator-units, reduction of the normal air-volume through the air-chamber due to *infiltration* of combustion air in the upper part of the furnace. Variations in the dimensions caused by slagging, and fusions in the course of operation must also be taken into account.

Ebonite Goods for Chemical Works

REDFERN'S RUBBER WORKS, LTD., of Hyde, Cheshire, have just issued an illustrated list of a range of goods made in ebonite for dealing with corrosive liquids in chemical and other factories. The list includes pipes, bends, taps, pumps, linings, coverings, jugs, funnels, buckets, etc., and gives details of measurements and sizes in which these goods are made. It should prove useful to works managers and others responsible for the equipment of factories in which such liquids are used. The acid-resisting properties of ebonite have been well proved, and it has many other attributes to recommend its use. It is flexible, light in weight, easy to clean and handle, possesses tensile strength and will not absorb water. Redfern's Works are equipped for making all classes of moulded and extruded goods in rubber and ebonite, and the manufacture of these articles of factory equipment is a natural development of their business.

Phosphates & Superphosphates: A World Survey

By A. N. Gray

The volume "Phosphates and Superphosphates," by A. N. Gray, published by the International Superphosphate Manufacturers' Association, London (pp. 275, 8s.) will be welcomed by everyone interested in the industry for its convenient form and size and for the comprehensive character of its matter and its 172 statistical tables relating to production, consumption, imports and exports, etc. The authors' object—to provide in a small compass a statistical history of the industry—has been admirably attained. The following extracts give some idea of the character and scope of the book.

Phosphate Rock

THE use of phosphate rock, ground to a fine powder, direct as a fertiliser, is a relatively modern development. Prior to the Great War, the quantity so utilised was small, but the needs of the belligerents for sulphuric acid during the period 1914-1918 seriously curtailed the output of superphosphate and, as a consequence, an impetus was given to the sale of ground phosphate rock. Another factor in this connection, which also had a considerable influence, is the change in certain countries in the methods of manufacturing steel. Formerly the basic slag obtained by the Bessemer process of steel making had a high solubility; but with the change to the open hearth method in some of the steel works there has been a reduction in the solubility of the phosphate content of the slag and many authorities have consequently recommended the use of ground phosphate as an adequate substitute for basic slag. Considerable difference of opinion exists as to the merits of ground phosphate as a fertiliser, indeed in some countries it can only be sold under certain restrictions laid down by the governmental authorities, *e.g.*, Germany. The principal consuming centres of ground phosphate as a fertiliser are France, Great Britain, Australia, United States, Germany, New Zealand, India and Ceylon, in the order named. It is probable that in these countries more than 380,000 tons are consumed annually. Fineness of grinding is regarded as an important feature, the usual standards being 90 per cent. to pass a screen having 10,000 or 14,400 holes to the square inch.

The use of phosphate rock on a large scale for the production of phosphoric acid by calcining is also quite a recent development and it is as yet too early to say whether the process is likely to become a serious competitor to the older methods of obtaining soluble phosphates. The process consists of grinding the phosphate rock and mixing it with silica and pulverised coke. The mixture is charged into a furnace and calcined, the phosphoric acid content being driven off at a temperature varying from 1,000 to 1,200 degrees centigrade. The high temperature required renders production by this method relatively expensive. In the manufacture of phosphate of ammonia it has the advantage of giving the required phosphoric acid direct, whereas if the so-called "wet" process (superphosphate method) is adopted the phosphoric acid has to be washed out after the superphosphate has been made and subsequently concentrated up to the required strength. In some of the large French and German synthetic fertiliser factories the calcining process has been adopted; but in other countries the tendency has been to use the wet process as being more economical in operation.

Metallurgical Uses

It is only during the last few years that any material quantity of phosphate rock has been consumed in steel works for metallurgical purposes. The phosphate rock used for the purpose is the Tunisian or Algerian 58/63 per cent. quality, from mines giving a mineral with a relatively high content of carbonate of lime. The use of this material has reached very considerable dimensions in Germany, whilst in Belgium also important quantities are used by steel makers. In Great Britain only a few steel manufacturers are using phosphate rock for the purpose. Probably about 300,000 tons of phosphate rock were so used in 1929, but it is thought that there will be a reduction for 1930.

For the other purposes mentioned, viz. :—the manufacture of phosphorus, acid calcium phosphate, pharmaceutical products and miscellaneous purposes such as stock feeding, the total quantity of phosphate rock used throughout the world is not very great considered in relation to the consumption for fertiliser production.

At first the development in production was very slow, for in 1869, twenty-three years after phosphate rock was originally mined in 1847, the world's total output had only attained about a quarter of a million tons. It was in 1887, when the phosphate mining industry was in its forty-first year, that the output first reached one million tons; but thereafter progress became much more rapid.

Since the advent upon the market of Florida and N. African phosphates, in the decade 1890–1900, there have been recurring periods of over production with a resultant check in output in succeeding years. The opening up of the phosphate deposits of the United States and N. Africa had a very marked effect upon the phosphate mining industry of Great Britain, and others of the older phosphate mining countries were soon affected more or less seriously. In Great Britain production rose rapidly from 1870, until in 1876 the high water mark of 262,022 tons was reached. Thereafter it fell in the succeeding year to less than one-third—70,102 tons—undoubtedly as a result of the shipment to Great Britain of Carolina phosphate, the production of which rose almost as rapidly as the British production fell. After a slight revival in 1882-1884 the British output commenced to decline again, and by 1894 it had diminished to the nominal figure of 711 tons, finally ceasing in 1903.

Phosphate Trade

To-day (1928) Europe consumes over 57 per cent. of the world's production of phosphate rock; N. America, principally the United States, about 28 per cent.; Australia and New Zealand about 7 per cent.; whilst the balance, 7·87 per cent., is used by Asia and Africa. During the past few years, particularly since 1922, there has been a rapid increase in the demand for phosphate rock due, no doubt, to the decreasing supplies of animal manures caused by the development of motor transport. It cannot seriously be thought that saturation point has yet been reached in the demand, for there are very large areas of the earth's surface which are not yet receiving any material dressings of phosphates. The use of phosphates in South America, in the continent of Asia (excluding Japan) and in Africa (excluding the extreme north and south) is so small as to be negligible, and these areas are bound to develop considerably in the course of time as phosphate consumers. Considered from the point of view of tonnage used in individual countries, the United States is the largest consumer of phosphates, followed by France, Germany and Italy in the order named.

The phosphate trade of the world tends to become more concentrated as time passes. Thus Europe, which, at one time, drew supplies from all parts of the world, is tending more and more to rely upon North Africa for its requirements: the growing demands of Australia and New Zealand are, in the main, being met from Ocean and Nauru Islands in the Pacific; Japan obtains most of her phosphates from the Pacific, but is also an important buyer of Egyptian phosphates; America (United States) has more than sufficient for her entire needs and is a large exporter of phosphates, mainly to Europe.

Superphosphate

Superphosphate, as its name implies, is a manufactured form of phosphate. The phosphoric acid content of phosphate rock is in a relatively insoluble form, indeed it is quite insoluble in water, and the object of Lawes in introducing superphosphate was to offer to farmers a material containing its plant food, phosphoric acid, in a water-soluble state. The process of manufacture consists of grinding phosphate rock to a fine powder and dissolving the powder in sulphuric acid. The principal constituents of phosphate rock are phosphoric acid and lime, which two elements are combined in a form that is referred to as tribasic phosphate of lime. The action of the sulphuric acid on the powdered rock is to break down the phosphoric acid-lime combination, part of the lime uniting with the sulphuric acid to form sulphate of lime, leaving the phosphoric acid in a monobasic form which is soluble in water. Although sulphuric acid is used in

making superphosphate, it is neutralised when it combines with the lime and, as the compound sulphate of lime is stable, it is maintained and has been proved beyond dispute, that superphosphate neither does nor can have any acidifying effect upon soils to which it is applied, even in heavy quantities annually over a long term of years. Its value as a fertiliser is unquestioned; it is at once the most valuable and the most widely used phosphatic material, and its use has grown until in 1929 upwards of fifteen million tons were consumed by the world's agriculture.

The original patent for the manufacture of superphosphate was taken out by Lawes in 1841, but a few years later it was being made at other works in Great Britain and by 1853 there were several (probably four or five at least) manufacturers producing superphosphate. Lawes brought an action against certain of these manufacturers for infringing his patent in 1853, but he was unsuccessful in his plea of novelty, though judgment was given in his favour on certain points, and he bought up his opponents' patents, amending them to bring them in line with his own. Superphosphate was first made by Lawes at Deptford, in South East London, in a barn converted for the purpose, and he devoted his private estate at Rothamsted, near Harpenden, to experimental work with this and other fertilisers. His greatest service to agriculture was undoubtedly the institution of this experimental work, which he continued to develop through a long life, and, thanks to his generosity, his estate became the first agricultural experimental station, now known throughout the world as Rothamsted.

Superphosphate Production

It seems to be clear that from 1842 to 1854 superphosphate was only manufactured in Great Britain. For this period the output of coprolites is known, and allowing for the quantity which would, at that time, be made from bones, it is probable that from the small beginning at Deptford in 1842 the production had risen by 1854 to about 30,000 tons per annum. About this time France and Germany commenced the manufacture of superphosphate, but there is no record as to the quantity produced, nor is there any reliable means of framing an estimate. Unfortunately, too, in the early years, there was a good deal of confusion as to phosphates in the customs returns of different countries, many materials, from superphosphate itself to guano, were bulked together in the import and export returns, so that there is no ready means of discovering what was the phosphate import of the various countries, which otherwise would have been a guide to the development of the superphosphate industry. It was not until 1882, so far as the writer is aware, that the customs entries of Great Britain permitted the determination of the import of phosphate rock, as such, and although every effort is made to-day to secure a proper description of merchandise entering this country, the returns of phosphate rock imported still include some few items of basic slag, superphosphate and other similar commodities. In the United States of America, now the world's greatest individual producer of superphosphate, the manufacture is said to have commenced in the year 1868.

The War Set-Back

The set-back to the superphosphate industry occasioned by the war was not fully recovered for some years, for it was not until 1924 that the world's output again exceeded eleven million tons. In 1919, as would be expected, production was relatively small, for the disturbance the war occasioned in the chemical industry had only then begun to subside and, moreover, the essential raw material—phosphate rock—was in very short supply. In 1920, however, the world's output attained to within about 758,000 tons of the 1913 figure, principally as a result of phenomenally heavy production in the United States. The closing months of 1920 witnessed the commencement of the great post-war slump in commodity prices, which had such a serious effect upon superphosphate production that 1921 fell short of 1920 by no less than 2,366,000 tons—almost 22½ per cent. There was a good recovery in 1922 and further progress in 1923, but the most remarkable advance occurred in 1925, for which year an increase of more than 1,842,000 tons was recorded over 1924.

The best and most promising feature of the advance made in 1925 was that it was widespread and general, a consideration from which it was deduced at the time that the increase would be maintained. In each succeeding year since 1925 further increases have been recorded, the fourteen million ton mark being passed for the first time in 1927, whilst, as a result of a further substantial advance in 1928, a total of over fifteen million tons was produced.

It is quite clear that saturation point is as yet very far from being reached, considering the world as a whole, for, as will be seen when consumption is considered later in the present work, there are vast areas to which, as yet, little or no superphosphate is being applied. Whether there will be any very great increase in the output of superphosphate in future years depends entirely upon the progress made in other methods of manufacturing water-soluble phosphoric acid, but there seems to be every reason to assume that, even allowing for a substantial demand for soluble phosphoric acid produced by other means, the output of superphosphate will continue to expand, so great is the scope for a more extended use of phosphoric acid fertilisers.

British Superphosphate Industry

For many years Great Britain, as the original and the largest producing country, enjoyed almost a monopoly of superphosphates exports, and it is of academic interest to find that in the proceedings of some of the national trade associations in the decade 1880–1890 reference is made to the trouble the home industries were experiencing from imports of superphosphate from Great Britain. Unfortunately, in the early years the trade returns of Great Britain do not distinguish between superphosphate and other forms of phosphatic fertilisers, hence it is impossible to say definitely the nature and extent of the export trade done by Great Britain. As with exports so with imports, in Great Britain and in connection with most other countries, separate superphosphate statistics are not available until a comparatively recent period. Great Britain did not figure as an importing country in connection with superphosphate until 1894; but it was not until 1903 that separate statistics were taken out. It will be clear that if Great Britain, as the country originally producing superphosphate, became an importer as early as 1894, by this period the interchange trade had become more general in character and it is, therefore, all the more to be deplored that separate statistics do not exist, as they would have enabled the development to be traced with a degree of probability, if not of accuracy, which in their absence cannot be attained.

An Important Change

But, even in the absence of statistics, it can be asserted with confidence that the change which occurred in the process of manufacturing alkalis had a very considerable influence on the superphosphate industry. Great Britain, Belgium and other countries originally worked the Leblanc process for alkalis, which entailed the use of considerable quantities of sulphuric acid. The invention of the electrolytic method, which quickly superseded the older process of alkali production, obviated the use of sulphuric acid, with the consequence that very considerable quantities of acid were set free and the problem before the alkali industry, as to how to absorb this acid, was solved by using it for the manufacture of superphosphate. The old records of the British association show that the resulting increase in the quantity of superphosphate produced in the country constituted, for many years, one of the most difficult problems with which the industry was called upon to deal, and no doubt the same would be true of Belgium, France and Germany.

The manufacture of one ton of superphosphate absorbs about 11 cwts. of sulphuric acid of, say, 120° Twaddell or 68·7 per cent. H_2SO_4: the other raw material required, phosphate rock, is produced in large quantities in a few countries of the world and consequently it can easily be shipped to any destination; in other words, to any place where an excess of acid exists. As it formed for many years the only important possibility of absorbing any material quantity of sulphuric acid the superphosphate industry, after the alteration of the process of manufacturing alkalis, found itself oppressed by all the evils of extensive over-production. The result was that prices fell to levels which were unremunerative, and the industry, pressed from all directions by low priced imports, was not able to modernise its equipment or to pay that attention to technical development which would have made it strong and healthy.

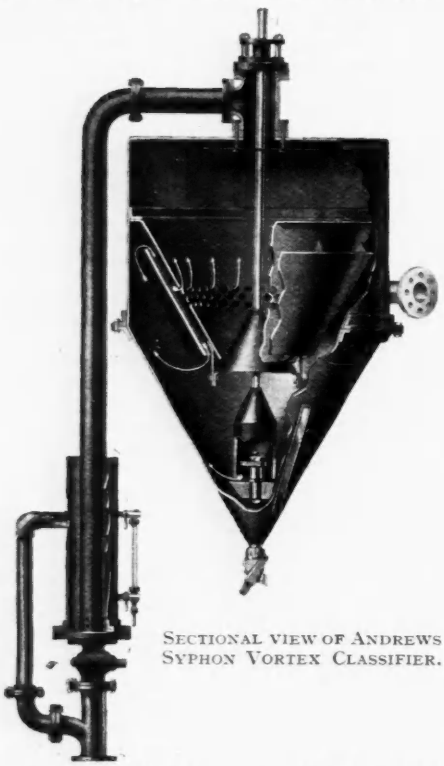
Chemical Plant and Engineering

Notes on Some Modern Products

Some recent developments in the field of chemical plant manufacture and the lines of development which are being pursued by famous firms, are reviewed in the following notes.

Vortex Classifiers

A BRITISH scientific plant development which completely supersedes the wash-tub methods of classifying the potter's ground materials has been introduced in the Potteries and is the subject of a paper recently read before the Ceramic Society by Mr. Leonard Andrews, M.Inst.C.E. With the presence of the human element in the existing method of classification, a continual variation in the size analysis of the product is unavoidable, and furthermore, no two mill hands are capable of washing up a batch of material to the same grade of fineness. This new plant, the Andrews Syphon Vortex Classifier, is completely automatic and can be designed to give



SECTIONAL VIEW OF ANDREWS SYPHON VORTEX CLASSIFIER.

a constant grade of material to any specification. It has been employed in classifying the product of a batch grinding mill and, through its automatic action and ease of handling the slip, it has been the means of increasing the output by some 30 per cent.

It appears that this invention will cover a wide field of uses in the chemical industry for such purposes as washing, or for the extraction of solids from liquors, etc.

A section of the plant is shown above. The material is pumped at a high velocity through the tangential inlet shown on the right-hand side. The oversize is rejected from the spigot shown at the inverted apex, while the fine material rises through a large area to the top of the classifier, where it flows into a pipe, causing a syphon. It is obvious that the quantity of water discharged with the oversize, and the hydrostatic pressure at the spigot, are entirely dependent upon the length of the syphon pipe. The drowning arrangement, shown at the discharge end of the pipe, is operated by a valve and is a simple means of varying the effective length of the pipe, which in its turn controls the quantity of oversize material discharged.

It is not possible to deal here with the theory of the plant. It must suffice to say that the classification is effected partly by high velocity and centrifugal force, and partly by low velocity and gravity. We are informed that the plant installed in the Potteries, which is supplied by the Key Engineering Co., Ltd., 4, Queen Victoria Street, E.C.4 has completely fulfilled the purpose for which it was designed.

Synthetic Nitrogen Plant

In spite of the world industrial depression, the Bamag-Meguin concern, during 1930, maintained the important position it has held for many years in the design and construction of important plants for the chemical industry, particularly in the field of the recovery of nitrogen and nitric acid. Last year the firm built a large number of new plants all over the world, as well as carrying out extensions to plants previously built by them. Among new plants, the construction of which was started or completed during the year, the following can be mentioned :—Complete ammonia synthesis plant (" Mont-Cenis " process), for the Société des Mines de Lens ; three ammonia oxidation plants, for the Société Industrielle et

BAMAG-MEGUIN NITRIC ACID PLANT CONDENSATION TOWERS AT RAUXEL, CAPACITY 10 TONS OF AMMONIA PER 24 HOURS.

Financielle de Lens ; complete nitric acid plant, ordered by the well-known French heavy industry firm of Schneider & Cie, Paris, for the O.N.I.A., Toulouse ; complete nitric acid plant for the Elektrische Werke und Chemische Fabriken Lonza, Basle ; complete nitric acid and sulphuric acid concentration plant, ordered by Takata and Co., Tokio, for the Imperial Japanese Navy.

Among the extensions to existing plants carried out during the year were :—Ammonia oxidation plants, for the Wintershall A.-G., Sonderhausen, for the Gasverarbeitungsgesellschaft m.b.H., Herne, and Pânstowa Zwiaskow Azotowych Mosicach, Moscice.

In other fields of the chemical industry the following important plants have been delivered :—Twelve complete acid coolers, of " Bamag-Meguin " special ferro-silicon, for the Gasverarbeitungsgesellschaft m.b.H., Herne ; benzene recovery plant, for I.G. Farbenindustrie A.G., and water gas plant for the Municipality of Cassel.

In the field of water filtration, the following plants have been constructed :—Complete water works and purification plant, for Karl Zeiss, Jena ; water works plant, for the Municipality of Greiz, and complete filtration plant (" Adler " process), for the Municipality of Stuttgart. A complete refuse destructor plant (" Heenan and Froude " system) has also been supplied for the municipality of Lyons. During 1930 the first commercial size unit employing the Bamag-Meguin process of oxidising nitrogen (in the form of pure ammonia gas) with pure oxygen to form concentrated nitric acid was put into operation at Bayerische Stickstoffwerke, Piesteritz.

Filtration and Drying

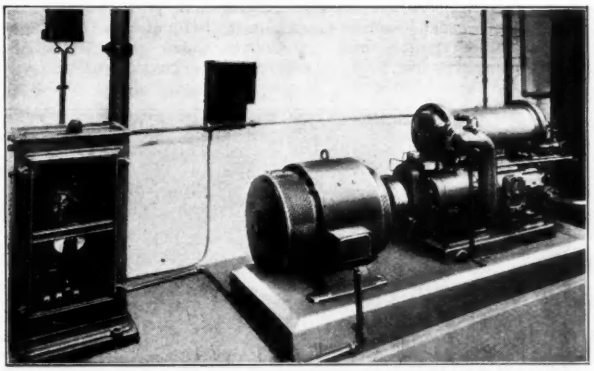
During the past five years the Oliver United Filters, Ltd., have been carrying out experimental work in connection with the incorporation in one stage of filtration and drying of crystalline materials. As a result of these investigations two distinct and highly successful types of filters have been evolved. For handling crystals of relatively low specific gravity a tank type of filter is employed, the filter also being equipped with steam or hot air hoods in order to reduce further the moisture content of the material.

As an indication of the results that may be obtained by this method the firm have in operation a plant operating on vacuum pan salt where the salt discharged from the filter is at 2 per cent. moisture content, this result being obtained with a high filter capacity. For handling heavy crystal magmas a modification of the above type of filter has been found to be necessary. In this case a top feed filter with a feed hopper on top of the drum and with consequent elimination of the filter tank has successfully overcome the trouble experienced with the standard type of tank filter. This construction, together with the application of the hot air or steam hood, has resulted in satisfactory operation upon many materials which hitherto have not been capable of being handled upon rotary vacuum filters.

According to the physical nature of the crystals and the degree of heat used, moisture contents in the discharged material will vary from approximately 1·5 to 6 per cent. when operating upon crystalline products. Some of the important advantages of the Oliver top feed filter arise from its continuous and automatic operation, its slow speed reducing frictional and consequently "wear" losses to a minimum, and low operating cost. One man can superintend the running of a number of filters, the only mechanical attention necessary being periodic oiling and greasing.

Rotary Compressors

One of the first considerations in the choice of chemical plant is its suitability for continuous operation and its reliability under conditions which do not obtain in ordinary usage, and in view of the extent to which compressed air is used in the chemical trade, the simple and efficient compressors and vacuum pumps offered by the Rotary Air Compressor Co., Ltd., of London, have many claims to attention. This firm has over 20 years' experience in the manufacture of rotary compressors, and their products have been tested out under actual working conditions in all industries. The machine is of the sliding vane positive type, the vanes being restricted by floating rings, of special design, so that there is no contact between the blade tip and the casing. The single-stage types are capable of delivering air up to 70 lbs. per sq. in. in the smaller sizes. The permissible final pressure, however,

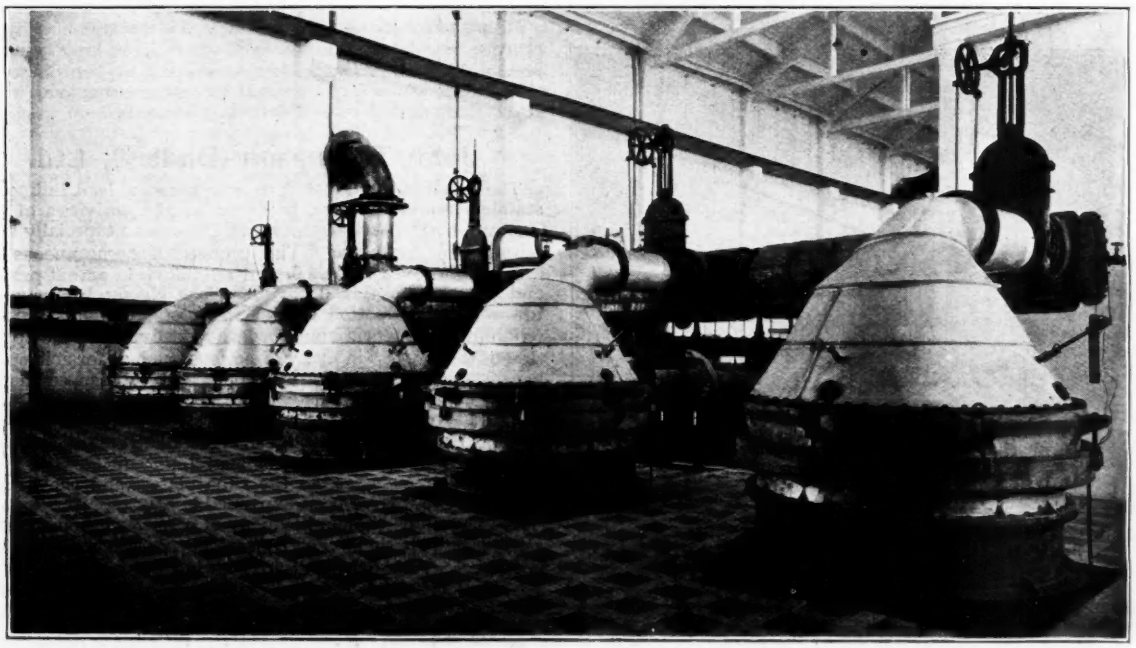


TWO STAGE COMPRESSOR, BY THE ROTARY AIR COMPRESSOR CO., LTD., DIRECT COUPLED TO MOTOR.

decreases as the size of the machine increases, but two-stage machines can be offered for pressures up to 150 lbs. per sq. in., and in the case of vacuum pumps a vacuum of 99·5 per cent. of the barometer is obtainable.

There are no valves or reciprocating parts, and, in addition, the balance of the machine is so excellent that it can be run at high speeds. It is therefore capable of being direct coupled to standard high speed motors, thus eliminating transmission losses.

The illustration shows a two-stage compressor, direct coupled to motor, arranged for automatic electric starting, and operating at 100 lbs. per sq. in. It should be noted that no governor is fitted, as the torque required to start the rotary compressor is much lower than that of the reciprocating compressor, and the machine is capable of starting against full pressure on the discharge. It should also be noted that the space occupied is very small, and further that silence in running is obtained. The efficiency is maintained during the whole

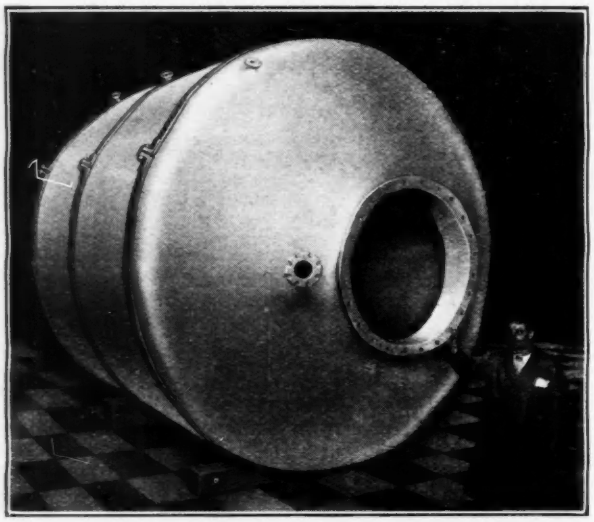


BAMAG-MEGUIN AMMONIA OXIDATION PLANT, CONSISTING OF NINE ELEMENTS, EACH WITH A CAPACITY OF 3·6 TONS OF AMMONIA PER 24 HOURS.

period of working extending over many years, as the blades are self adjusting for wear. In fact, the efficiency improves slightly during the first three months and is comparable with the best class of reciprocator.

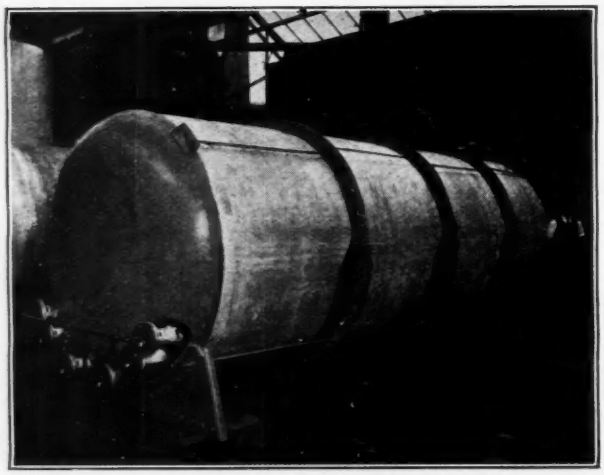
Aluminium Plant Developments

Perhaps one of the biggest advances in plant construction during the past year has been in the development of large castings for the chemical industry. Until quite recently it had been difficult to turn out castings that were not very



20-TON ACID STORAGE TANK MADE BY THE ALUMINIUM PLANT AND VESSEL CO., LTD.

porous, and thus vulnerable towards corrosion. Attention, had, however, been turned to the aluminium-copper and aluminium-silicon alloys. Both these series give dense castings which have satisfactory mechanical properties. From the chemical point of view the silicon alloys have a wider field in view of, in general, greater corrosion resistance. Such resistance is shown at best in the sodium modified silicon alloy. The development of this alloy has been very extensive on the



ACID TRANSPORT TANK CONSTRUCTED BY THE ALUMINIUM PLANT AND VESSEL CO., LTD., BEFORE MOUNTING.

continent of Europe, and in this country large castings are now being made. One of 9 cwt. has recently been finished, and is thought to be the largest aluminium-silicon casting yet produced. The aluminium-silicon alloy is marketed under the name of Alpax. In a few isolated cases it is even more resistant than aluminium sheet of high purity.

The acetate side of the artificial silk industry has, during the past year, been installing aluminium plant, directly and indirectly, more than ever before and it has also been fairly widely used for organic esters for a variety of industrial purposes.

One very interesting development of aluminium has been in the manufacture of tanks for the storage of chemicals. Some of them have been built as large as 18 ft. in diameter, and 20 ft. 6 in. in height, and these are of wholly welded construction. For the transport of chemicals large aluminium rail tanks have been constructed and are now in satisfactory use. Aluminium drums have been supplied in three or four directions in large numbers—thousands must now be in use. The development of aluminium road transport tanks has proceeded more slowly, but there is distinct evidence that for the transport of many materials, including edible oils and fuel oils, the lightness of aluminium, enabling a greater effective load to be carried, is becoming recognised as an important factor.

In the varnish and oil industry the development of aluminium plant in conjunction with up-to-date processes has progressed to a considerable extent. These processes were previously the particular property of the German technicians, but have now been brought nearer to perfection in this country by the addition of certain apparatus hitherto not available to the German market.

Homogeneous Lead Lining

An entirely British method of homogeneous lead lining of chemical vessels, claimed to be at least as efficient as the best work that comes from the Continent, has been developed by R. Marsh and Co., of Riverbank Works, Stratford, London. The homogeneous covering is applied to the metal in such a manner that both are knit together and really become one, and it is impossible to separate the two metals even under the most trying working conditions. The advantages of this process are as follows: (1) The nature of the lead is not affected in any way, and afterwards it is still malleable and ductile. (2) Sagging and creeping is entirely avoided. (3) Repairs due to local corrosion or accidental damage are easily effected without stripping the remainder of the vessel as was necessary with the old process. (4) Maintenance and repairs are reduced to an absolute minimum. (5) It can be used for all types of plant, whether working under pressure or vacuum, without blistering or parting from the outer container. (6) It will withstand vibration, which is often met with in mixing and similar vessels working with agitating gear.

Homogeneously lead lined vessels can be supplied by this firm for any description of plant where loose lead lining was previously used, such as acid eggs, evaporators, benzol washers, acid filters, saturators, vacuum vessels, stirring and mixing gears, lead covered coils, dyeworks plant, etc.

John Thompson (Dudley), Ltd.

The department devoted to homogeneous lead linings and stainless steels are two branches of the activities of John Thompson (Dudley), Ltd., which have been especially active during the past year. The process of homogeneous lead lining has proved its worth and reliability in actual practice, and progress in this department has chiefly been directed towards the reduction of working costs, without impairing reliability. The firm have successfully advocated the application of this process in many directions, such as for acid sprays, benzole washers, callandrias, coils, and tubular condensers, preheaters, evaporators, steam heated mixers, hydro extractors and pressure and vacuum pans. It is now a practical proposition to manufacture mild steel tubular vessels, having a continuous and homogeneous lead lining inside the tubes, around their ends, across the tube plates, and the headers, after the tubes have been expanded.

This involves the employment of a new method of homogeneous application. For general purposes, chemically pure lead is used, but where desired, owing to abrasive action or the like, any predetermined percentage of antimony can be thoroughly incorporated with the lead to suit customers' specification or the firm's recommendation.

The stainless steel department has been studying the fabrication of vessels in various alloy steels, so as to ensure that the welds and adjacent material are as nearly as possible equally

resistant to acids, etc., as the parent metal. In addition to the ordinary mechanical tests, this involves strict control by microscopic and corrosion tests, and considerable progress has been made along these lines.

Pumps and Compressors

The Year 1930 has seen further developments in the Model "D" range of pumps of the Sihi Self Priming Pump Co., Standish Road, Fallowfield, Manchester. Although manufactured under the original patent, numerous constructional improvements have been embodied giving an all round improvement in performance. One of the smaller units, *e.g.*, Model D.214 pump, when operating at a speed of 1,425 r.p.m., is capable of delivering quantities as low as 2 gallons per minute against a pressure of 100 lbs. per square inch, the horse-power absorbed being only 1 b.h.p. This is claimed to be a unique performance for a pump of the centrifugal type. In addition the same pump is capable of producing a vacuum of 29" of mercury, or compressing the air drawn in on the suction side to a pressure of approximately 60 lbs. per square inch.

Being designed primarily as a water pump, its capacity when operating as a vacuum pump or air compressor is naturally small, being in the region of one cubic foot displacement per minute. Even with this small displacement it has found useful application as a laboratory vacuum pump, and for exhausting small stills and drying ovens where a higher degree of vacuum than that mentioned above is not required.

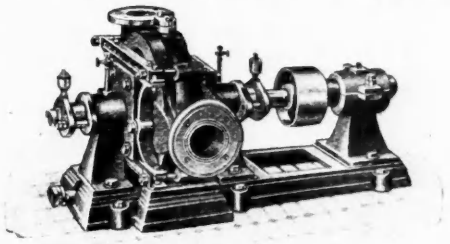
The same principle of operation is used for "Sihi" vacuum pump and air compressor, minor modifications being made in the design to suit the primary function for which they are to be used. When operating as a vacuum pump it embodies several valuable features. The displacement is continuous, exactly as with a centrifugal pump. There is no "dead point" as occurs at the end of each stroke of a reciprocating pump. No valves are embodied in the design and as the motion is purely rotary there are no pulsations or consequent vibrations. Liquid can enter the pump without damage resulting; in fact, liquid is the operating medium. This is usually water, but it can consist of any liquid suited to the conditions under which the pump is to operate. This feature is useful where the vacuum pump or compressor is called upon to handle gases which would normally have a corrosive effect on ordinary materials of construction. In a large number of cases it is possible to use a special operating fluid which neutralises the effect of the gases on the material of the pump, *e.g.*, in handling mildly acid vapours an alkaline solution can be used which protects the cast iron body of the pump.

The vacuum pump is capable of giving a constant capacity vacuum up to 95 per cent. of the barometric reading, and 99·6 per cent. against a closed suction. The pump has been widely adopted in the following spheres:—For priming centrifugal or reciprocating pump mains; in numerous chemical processes; for vacuum heating systems; wrapping machinery; filtration plant, etc. The air compressor is suitable for pressures up to 30 lbs. per square inch and as no internal lubrication is necessary it is particularly suitable where perfectly clean air is required such as is demanded by the food industry. Both vacuum pumps and compressors are made in sizes up to approximately 100 cubic feet per minute displacement.

Acid Resisting Iron

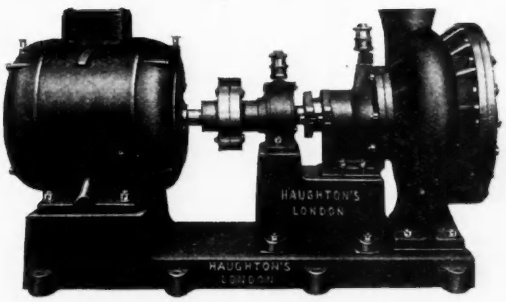
There has lately been a very decided tendency on the part of chemical manufacturers and chemical engineers to substitute acid-resisting metals for the various forms of pottery and other ceramic materials used in the construction of chemical plant, for mineral acids such as nitric and sulphuric, and also for plant in connection with the explosive and dyestuffs industries. Haughton's Patent Metallic Packing Co., Ltd., of London, have developed the acid-resisting irons or silicon irons to a very high degree, and during the last twelve months they have installed a considerable variety of acid-resisting plant. Much of it has been carried out in Ironac acid-resisting iron, the well-known ferro-silicon alloy resistant to nitric acid and sulphuric acid. For the explosives and synthetic nitrate industries a considerable amount of the plant is of exceptional design and construction, and to provide adequately for the production of much larger pieces of work the Haughton Co. have arranged during the last year for a much larger foundry.

Among other plant upon which this firm has been engaged, may be mentioned some large stills and concentrating plant for acid works and producers of artificial fertilisers. Some interesting acid distillation columns of large capacity have also been recently constructed in Ironac acid-resisting iron. This plant involves the manufacture of distinctly complicated castings of large size in Ironac high silicon iron. Numerous plate sections for rectifying towers which have been incorporated in this unit have been cast in one piece of 4 ft. 6 in. diameter. Some further improved plant comprises a series



HAUGHTON CENTRIFUGAL ACID PUMP.

of Ironac ferro-silicon tubular condensers and coolers in connection with nitric acid manufacture from synthetic nitrogen. It has been proved that Ironac metal possesses far higher conductivity than any of the materials formerly used, and consequently cooling during condensation can be more rapidly effected and far higher efficiencies obtained from the plant, to say nothing of the increased strength of metal pipes and vessels as compared with the more brittle materials. For concentration of H_2SO_4 by all the various known methods, Ironac acid-resisting iron still continues very much in demand both for heat resistance and acid-resisting parts of the plant.



HAUGHTON PUMP IN REGULUS METAL FOR DEALING WITH COPPER SULPHATE SOLUTIONS.

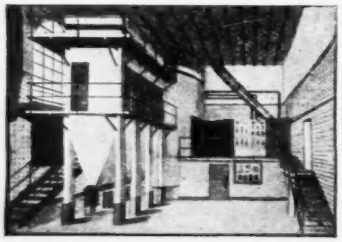
It will be readily recognised that in the application of material such as this for use in metallurgical and refining processes, a considerable amount of the work produced has to be carried out to users' own designs and specifications, and is constructed of an entirely special character throughout. During the last twelve months a notable advance has been made by the Haughton Co. in the design and output of centrifugal acid pumps for pumping nitric and sulphuric acid or mixed acids. The illustration above shows one of the latest designs largely used by sulphuric acid works for lifting chamber acid to towers and also in artificial silk works for dealing with sulphuric acid in circulation in connection with the Rayon process.

A large number of special pumps have been built and installed in regulus metal by the Haughton Co., not only for sulphuric acid but more particularly for dealing with copper sulphate solutions in metallurgical works abroad. They are designed to maintain a high efficiency, and show a marked advantage over the use of acid eggs either of the ordinary or automatic types for dealing with large quantities of acid and acid liquors. They are so arranged that the glands are subject to no pressure when the pumps are working, and consequently there are no difficulties experienced from leakage of acid at the glands.

Rapid Drying System

L. A. Mitchel, Ltd., Harvester House, 37, Peter Street, Manchester, have given us the following interesting information describing the new patented Ravo-Rapid Atomising Drying System. This dryer has been designed chiefly for organic substances, and has been successfully applied to the drying of malt extracts, milk, yeast, egg powder, fruit and vegetable juices, gelatine, blood, albumen, soap powders, etc.

Owing to the particular design and construction, the utilisation of the heat obtained with this dryer is technically and economically superior to that of other systems. The drying is carried out in a fraction of a second, and at a very low temperature, which does not in any way adversely affect the qualities of the product. The finished product, which is obtained as a fine powder, possesses the same properties and flavour as the original substance. Thus, research has shown that malt extract powders produced in the Ravo-Rapid Dryer contain almost exactly the same amount of diastase, whilst yeast produced as a powder in this machine has the same fermentation capacity as the original yeast. The operation is essentially the rapid drying—by means of air currents—of very finely atomised material, the collecting of the dried powder and the exhausting of the moisture bearing air. The entire operation is controlled by one man. The resultant product is a powder of uniform fineness, and requires no grinding or sieving.



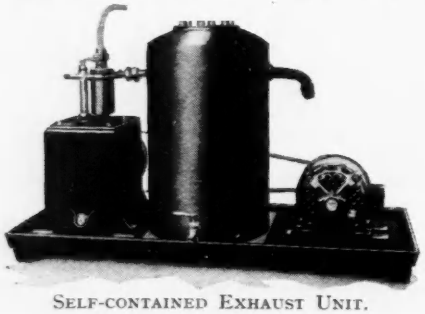
RAVO-RAPID DRYING ATOMISER.

Two other new features offered by L. A. Mitchell, Ltd., are a glandless centrifugal acid pump and a mercury-controlled pressure reducing valve. The glandless acid pump marks the very latest development in the conveyance of corrosive liquors. With it there is no drip such as is generally found with the ordinary type of centrifugal pump with packing gland, and friction is reduced to a minimum. The pump body, impeller, and all internal parts in contact with the liquor are of acid-proof stoneware, which is equally impervious to acids, alkalies or other corrosive liquors, whilst the latter, in their turn, are absolutely unaffected by contact with the stoneware. The outer casing, or armour, is of high-grade cast iron, and is of especially stout design.

The patent mercury-controlled pressure reducing valve is of extremely simple design, and is characterised by the entire absence of springs, diaphragms or pistons, the pressure being controlled by a valve operated by a column of mercury. This valve is claimed to be the only reducing valve which will maintain a constant reduced pressure in spite of variations on the high-pressure side, and of fluctuations in steam consumption. The simplicity of design of this valve ensures absolute reliability in operation.

Vacuum Pipe Line Installation

W. Edwards and Co., of 8A, Allendale Road, Denmark Hill, London, high vacuum engineers, have recently introduced



SELF-CONTAINED EXHAUST UNIT.

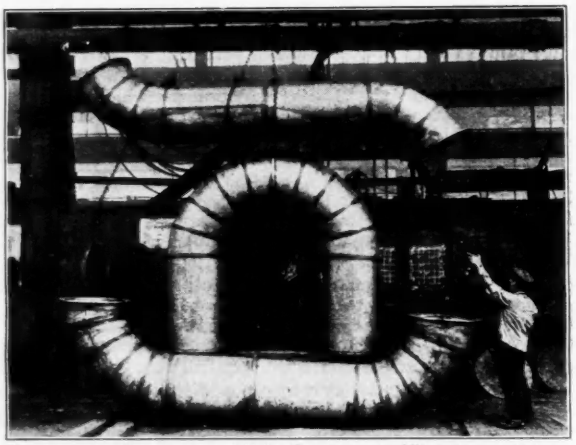
a vacuum pipe line system which has given great satisfaction to its users. The success of this system is due primarily to the use of a high capacity pump, especially designed taps, and care with detail.

Its features are absolute reliability, high vacuum, great pumping speed, silent operation, and a saving in running costs, as only a ⅓-h.p. motor is needed.

Edwards and Co. provide an oil-immersed rotary oil pump and interpose an absorption chamber for acid vapours between the pump and the pipe line. There is also a tap to isolate the pump, so that it can be used for special work requiring a lower vacuum down to 0·02 mm. As usually fitted, there is a switch for starting and stopping the motor close to each pumping position, and up to 24 pumping positions can be connected to each unit. One of the earliest of these installations consisting of 5 units was made for use in Lyons's Research Laboratories, Cadby Hall, Kensington, some two years ago, and was described in our pages. Since that date numerous other contracts have been carried out for various commercial firms and educational institutions, and they have always given entire satisfaction. The expense involved is comparatively small, and the cost of water saved can be added to other advantages.

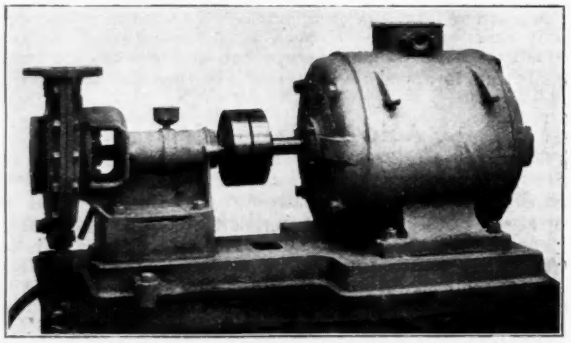
Acid Resisting Plant

In addition to their famous heavy oil engines, Ruston and Hornsby, Ltd., of Lincoln, manufacture a particularly wide range of centrifugal pumps and pumping plants, made in



STAYBRITE PIPES IN 18/8/1 CHROMIUM NICKEL-TUNGSTEN STEEL RECENTLY SUPPLIED BY RUSTON AND HORNSBY, LTD., FOR IMPERIAL CHEMICAL INDUSTRIES, LTD.

special acid-resisting metals, for chemical works and kindred trades. Among recent orders received by them is one for 31 of these special acid-resisting pumps for pumping nitric acid at Imperial Chemical Industries Works at Stevenston,



ONE OF 31 CENTRIFUGAL PUMPS SUPPLIED FOR THE ARDEER WORKS OF IMPERIAL CHEMICAL INDUSTRIES, LTD., BY RUSTON AND HORNSBY, LTD.

Ayrshire. The castings, impeller and spindles are of nickel chromium tungsten stainless steel, the bearings of the ball and roller type, no bearing coming in contact with the acid. Another interesting plant by this firm is illustrated above.

Welded Chemical Plant

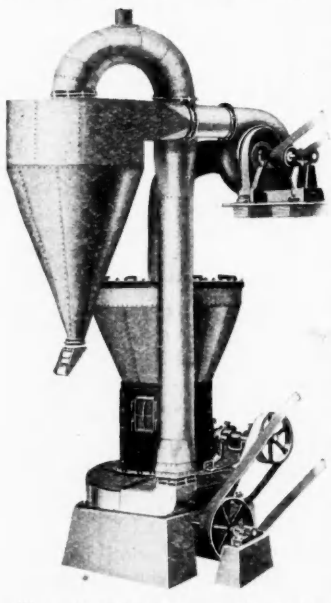
The firm of Robert Jenkins and Co., Ltd., of Rotherham, are now recognised as one of the most progressive firms of welding specialists. Established in 1856, they have, during the past ten years, devoted a considerable portion of their works to the production of welded chemical plant. Their plant has been trebled, and they have incorporated on their technical staff men with wide actual chemical works experience, so that to-day they are capable of turning out vessels of all shapes, weighing anything from a few lbs. to 20 tons. These vessels are constructed in mild steel, stainless steel, " Dalzo " steel, " Armco " iron, etc., and are lead, rubber or vulcanite lined if desired.

For vessels which have to be " lined " or which have agitators revolving inside, welding has proved itself vastly superior to riveted work, because it is possible to obtain a much smoother interior, with well-rounded corners. This feature obviates the difficulty, due to projections, of troublesome air pockets behind the linings, or limited clearances for agitators. All pressure vessels are designed and constructed in accordance with the regulations laid down by the Board of Trade and the leading insurance companies, being welded under the close supervision of an expert.

Robert Jenkins and Co. are manufacturers of storage tanks, receivers, blow-eggs, measuring vessels, separators, grinding mill bins, crystallising vats, brine coolers, caustic soda tanks, steam jacketed vessels, vacuum filters, evaporators, autoclaves, sulphonators, nitrators, rotary driers, condensers, calorifiers, fume ducts and welded pipe work. Apart from actual chemical plant they are also the manufacturers of the " Ivanhoe " Road Wagon Tank, which is of eliptical section, thereby ensuring the maximum capacity with a low centre of gravity. Though the standard tank is fitted for the conveyance of petrol, in accordance with Home Office regulations, it can be supplied for the conveyance of any liquid by the modification of the fittings.

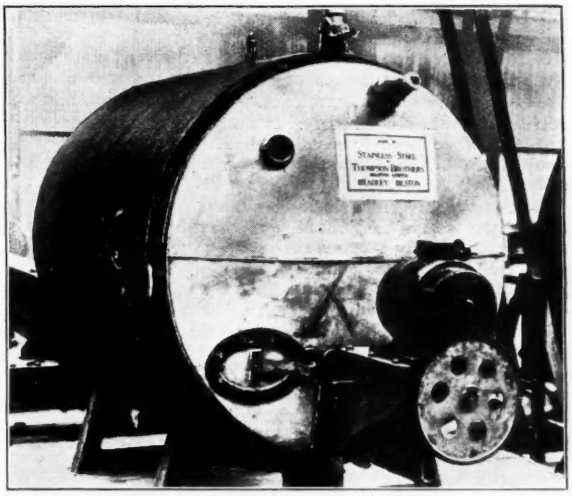
Mill for Non-Metallic Minerals

Among the well-known plant made by Mining and Industrial Equipment, Ltd., is the " Baby " Raymond mill, which is particularly adaptable to the handling of charcoal, ochres, oxides, umbers, limestone, barytes, talc, titanium, whiting, plumbago, slate, and other non-metallic minerals where small capacities ranging from 500 lb. to 2,000 lb. per hour are required. It is constructed on the same principle as the larger Raymond roller mills and is of the suspended roller type, in which the rolls are thrown out against the inside of a ring by centrifugal force, the grinding taking place between the rolls and the ring. Ploughs are fitted ahead of each of the rolls to pick up material from the bottom of the mill and carry it to a point where it will be thrown beween the rolls and the ring. The drive is through bevel gears and horizontal and vertical shafts, the gears operating in an oil-tight housing. A positive feed device is provided, and attached to this feed device is a pneumatic feed control which automatically controls the flow of material to the mill as it is being ground ; maintaining a full load on the machine at all times. Journals are of the old lubricated type, and the air-separating equipment is of the same type as used in the larger mills, including a double cone air separator, exhaust fan, cyclone collector, tubular collector and connecting piping. The whole unit is absolutely dustless in operation, thus ensuring a healthy atmosphere in the grinding plant.



Enamelled Plant

Chemical plant specialities provided by the Pragos Engineering Co., Ltd., 351, Brixton Road, London, include " Gebler " enamelled plant, autoclaves, condensers, crystallisers, evaporators, fittings, stills, tanks, trays, etc., made in standard sizes covering a wide range of capacities. A feature in the manufacture of this equipment is the adjustment of the composition of the enamel to the nature of the substance with which it comes in contact and with the shape and size of the castings. Seven standard qualities of enamel are employed, all of which are guaranteed free from poisonous substances.



1,000 GALLON JACKETED BULK STORAGE TANK WITH SIGHT GLASSES AND MOTOR DRIVEN AGITATOR, CARRIED OUT IN " STAYBRITE " STEEL BY THOMPSON BROTHERS, OF BILSTON

Over 250 types of Heine centrifugals are made, including continuous working centrifugals with automatic and semi-automatic charging and discharging, centrifugals with either top or bottom discharge, basket and drive suspended on girders, self-balancing suspended centrifugals with mechanically operated bottom discharge, and top discharge centrifugals mounted on girders or set into floors, underdriven and giving a convenient working level even for the largest machines. Filter presses and homogeneously lead-covered apparatus are also special lines in the equipment provided by the Pragos Co.

Kestner Plant Developments

The Kestner Evaporator and Engineering Co., Ltd., have been continuing the development of the various types of chemical plant in which they specialise. Development of their well-known and widely-used patent film evaporators has resulted in the installation of a patent multiple circulation evaporator, which is specially designed for dealing with sensitive liquors requiring a high degree of concentration. The satisfactory operation of this plant has proved that a very high percentage evaporation is easily obtained without affecting the properties of the liquor, these features being combined with the other well-known advantages of the Kestner film evaporator, such as continuous operation and short period of contact with the heating surfaces.

The use of British-made silica gel has been widely extended, particularly when employed as a catalyst support for the preparation of contact mass for sulphuric acid plants. Large quantities have been supplied for this purpose, and very efficient results have been obtained. Another important use of silica gel results from the fact that it can absorb a large percentage of water, which can subsequently be removed by the suitable application of heat without altering its physical properties. It is thus used for the removal of moisture from air and other gases. Its adsorption properties are very

valuable in the removal of moisture from compressed gases, such as CO_2, etc., as impurities in the gas are removed as well as the water.

Progress in connection with heat-resisting alloys has been in the construction of specially-designed air heaters for providing air at high temperatures heated by means of gases at 1,000° C. and over. The special air heaters that this company have provided have so far shown that there should be a very long life for the particular alloy steel that is used in their construction, and has also resulted in increased efficiencies of their patent spray-drying plants when operated in conjunction with an air-heater of this type.

Kestners have brought out a range of chemical plant which may be operated by means of electricity, and should be of increasing value on account of the increased availability of electric power at reduced costs. Amongst electrically-operated plants that have recently been installed may be mentioned, for example, air heaters, stills, autoclaves, bitumen melting plant, etc.

This company has also been developing a new type of plant, namely, the submerged flame evaporator (Brunler patent). This is a remarkably efficient means of evaporation, as combustion of the fuel used takes place in the liquor which is being concentrated. The steam produced during evaporation can be used for power or other purposes, whilst the plant occupies a very small space, and is particularly suitable for cases where high concentration is required. It is also of advantage for dealing with corrosive liquors, as the surfaces of the evaporator can be lined with materials which resist corrosion, whilst when concentrating scaling liquors the drop in output, due to the heating surfaces becoming coated, is obviated. The increasing use of solvent recovery plants has given rise to fresh distillation problems, which Kestners have successfully solved after extensive research.

Seitz Filters

Considering that the Seitz filters have only been introduced to the chemical industries in Great Britain for the short period of eight months, the progress already made can be regarded as most satisfactory. Numerous installations have been made, including in their range the following industries: Lacquer, vegetable and animal oil, soap, pharmaceutical, varnish, heavy chemical, artificial silk and sugar. On the Continent, the Seitz filters have proved more popular than ever, and several very big installations have been made. Two of the most recent consist of the following: Six "Hercules" No. 60, each with filtering surface of 635 sq. ft., for the filtration of water in an artificial silk factory in France, and seven "Hercules" No. 60, for the filtration of raw sugar juices, in a German beet sugar factory. The latter installation has been made for the working of a new process for the production of the raw beet sugar. The precipitation of the albuminous matters present in the raw juices has been brought forward to the first stage of the working-up process. The raw juice, direct from the presses, is treated with the necessary percentage of freshly burnt lime, thus precipitating completely all the albuminous matters present. The subsequent filtration through the Seitz filters combines two filtration processes—the preliminary filtration to which the raw juices are subjected in order to facilitate their handling, and secondly, the filtration that has to be given after the precipitation of the albuminous matters with freshly burnt lime. By bringing forward the precipitation of the albuminous matters to such an early stage, the precipitation is brought about more completely, and those substances aiding the formation of molasses are more completely eliminated. A better yield of sugar is thus obtained.

W. J. Fraser and Co., Ltd.

The work of W. J. Fraser and Co., Ltd., Dagenham, Essex covers a wide range, from the purely chemical engineering side such as the design and construction of perhaps some specia autoclave to meet difficult conditions of pressure, temperature and corrosion, to a complete factory installation, including all plant required from the raw material through to the finished product. Frasers' experience in this work covers nearly a century, and they are patentees and licensees of many of the most advanced designs in plant for drying, evaporation, distillation, oil and tar refining, acid manufacture, etc. A works thus equipped is obviousl in a position to handle the everyday requirements of the chemical manufacturer. A considerable proportion of ı rasers' output does, in fact, consist of stills, mixers and other general welded and riveted vessels, of the same high standard of workmansihp and finish as the more elaborate plant.

A Typical Order ready for Delivery at W. T. Fraser and Co.'s Dagenham Works.

Mixing Machinery

Alfred R. Tattersall and Co., milling engineers, London, have been very active during the past year in developing and adapting the Geyser vertical screw type mixing machine for many purposes. There has been a strong demand from trades engaged in the preparation of colours for the manufacture of paint, inks, etc., for a machine that will make an efficient blend of batches of colour coming from edge runner mills and so on, to enable manufacturers to deliver quantities of two or three tons of powder of a thoroughly guaranteed even colour throughout. The Geyser Mixer lends itself particularly to this class of work, because it can be easily cleaned out when changing over from one colour to another. It is quick in action, takes little power, discharges itself practically clean, and can be rendered absolutely dustless.

A further use has been in the plastic trades for the incorporation, for example, of colour into wood flour, without the compressing action or balling action which takes place in trough mixers or drum mixers respectively. It is possible to incorporate 3 per cent. and upwards of colour perfectly throughout wood flour in these machines. Experiments have also been carried out in the mixing of heavy materials for briquetting purposes, and the machines have been successfully put to work on mixing anthracite duff, graphite, etc., in this industry. A new development at present in hand is a combination of a sifter and screw elevator, to enable the machine to be installed, to be fed and to deliver on one floor. This should be particularly interesting where economy of space is essential. An experimental machine of the standard Geyser type is available for tests to be carried out, and A. R. Tattersall and Co. are open to investigate mixing problems that are applicable to this type of machine.

Birmabright Alloy

Birmal Chemical Engineers, a branch of the Birmingham Aluminium Casting (1930) Co., Ltd., is concerned in the fabrication of all types of plant in welded sheet aluminium and in the production of cast aluminium alloy plant and equipment for a variety of special applications, including the manufacture of acetic acid, artificial silk, varnish, lacquers, edible oils, margarine, beer, cider, foodstuffs, as well as general and pharmaceutical chemicals.

During the past year their special corrosion resisting aluminium alloy, Birmabright, has been developed from the cast form into rolled sheet, extruded sections, bars, rods, etc. This development permits the use of the alloy for a wider range of chemical engineering productions at a strength very much greater than that of pure aluminium. In the sheet, extruded and drawn forms, Birmabright alloy can be worked in a similar manner to pure aluminium. It can be welded auto-

genously and the welds dressed and hammered when cold. It is not a heat treatable alloy, and the difficulties encountered in the forming and welding of vessels from alloys deriving their high physical properties from heat treatmentare, eliminated.

Pressure Filters

F. Jahn and Co., 15, Britannia Street, King's Cross, have during the past year given attention to improvements in the construction of pressure filters, which they supply mainly for clearing thin liquors prior to concentration in their multiple effect vacuum evaporators. In one type of pressure filter the liquor is pumped through 2 in. thick layers of packed cotton or flax fibre. The fibre is cleaned in a washer fitted with a fast-speed circulating propeller. Whilst wet, the fibre is made up into 20 in. diameter by 2 in. thick cakes. One such cake is placed between each pair of aluminium alloy discs, which bear deep grooves arranged so as to make it unnecessary to provide interposing wire mesh gauze. Seven such filter-medium cakes, arranged between eight discs in a press, give passage to an average of 500 gallons per hour of liquor.

Jahn's patents include another pressure filter, of the totally-enclosed type, which answers the purpose of building up filter cakes on 400 sq. ft. cloth surfaces, arranged on double-screen leaf frames. One man can open and shut the machine, between filtering operations, the cake being discharged automatically. This pressure filter, which is fed through a 4 in. pipe, can also be used for decolourising purposes, by first depositing, in alluviation, a layer of activated carbon on the cloths, and then filtering (using a pressure which may reach 100 lbs. per sq. in.) at the rate of about 7 tons per hour.

W. Rowlandson and Co.

Many types of mixing machinery are manufactured by W. Rowlandson and Co., hydraulic, chemical and general engineers, of 75, Mark Lane, London, and they have developed the patent "Autosell" mixer for handling pastes in many forms, paint, toilet and pharmaceutical preparations. The principle of a free revolving head inside a positively driven pan reduces

The "Autosell" Mixer

the power used to a minimum and the stirrers rotate automatically according to the viscosity of the material under treatment. The pan is removable from the table and the stirrers instantly swing clear so that cleaning of the blades is a matter of minutes only. The machine is built in sizes from 2½ to 40 gallons capacity. Monel metal and Staybrite stainless steel may be used when required.

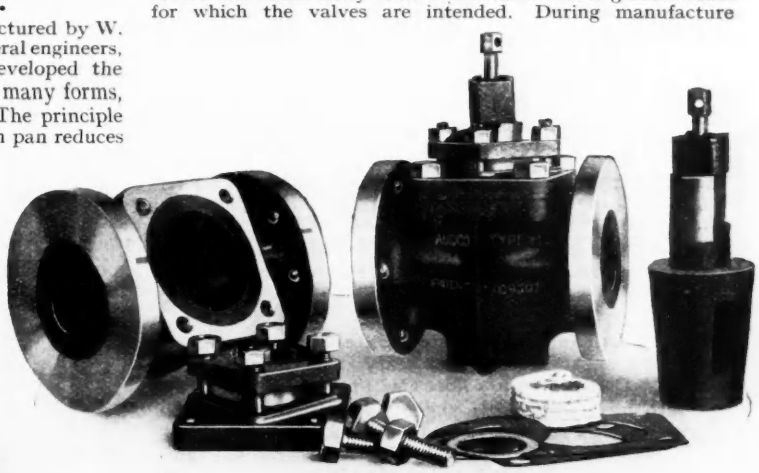
Reinforced Ebonite Valves

Hard rubber, or ebonite, is a particularly valuable material when used as a protective covering for vessels, pipes and equipment needed in the storage and conveyance of numerous chemicals, notably of sulphuric, hydrochloric, nitcir and acetic acids, etc., and also for liquids used in electrolytic processes.

As a material of construction, ebonite is too fragile for use without the support of some structurally strong material; hence we find mild-steel and cast-iron tanks and pipes homogeneously lined with vulcanised rubber. The many difficulties attendant upon the production of such units have been surmounted; but a new problem arose with the demand for valves to control the flow of these chemicals, for such valves had to be provided with seating surfaces and all fluid passages of hard rubber. Ebonite plug cocks have been used, but the inherent tendency for the plug to stick in the body, and the very great danger of fracture of the body as a result of anything but the most gentle handling, left much to be desired.

The Audley Engineering Co., Ltd., turned their attention to the problem and, after much experimenting, have produced the reinforced ebonite valve as a further addition to their range of Audco patent lubricated plug valves. In the reinforced ebonite design, the well-known feature of Audco lubrication of the working surfaces by special semi-solid insoluble lubricants is embodied in a plug valve having the strength and appearance of cast-iron, while all internal surfaces are of ebonite.

The range up to 6 in. bore has been designed for a working pressure of 60 lb. per sq. in., with a hydraulic test pressure of 120 lb. per sq. in. This ensures its ability to suit the most severe conditions likely to be met with in handling those fluids for which the valves are intended. During manufacture



Assembly of the Reinforced Ebonite Valve of the Audley Engineering Co., Ltd.

rigorous tests are applied, including a 10,000 volt insulation test to expose any weakness in the ebonite protection of the iron reinforcement.

The smooth operation of these valves with the interposed lubricant film between the ebonite seating surfaces, and the facility with which they can be maintained in that condition are a revelation to those who have had experience only of ordinary ebonite cocks, and the sense of security which the reinforcement adds permits installation in positions hitherto regarded as too vulnerable.

There is no limit to the size of valve which can be constructed on this principle, and the lubricant film ensures as perfect an operation of the 12 in. bore as of the 1 in.

Meldrum Acid Resisting Pumps

Meldrums, Ltd., Timperley, Cheshire, have had a successful year with their "Meldrum" acid resisting metal, and have re-designed several of their specialities. Considerable improvements have been made in their centrifugal acid pump, which is now built with an impeller, having a double inlet. The impeller [is in] complete balance, thus avoiding end

thrust, and the gland is also under suction, thus preventing any leakage. The impeller is supported independently of the casing by means of a double row of ball-bearings, well spread out, so that no weight comes on the stuffing box. The shaft is covered with a sleeve of "Meldrum Metal," where it passes through the gland, and this, of course, is renewable. The shaft itself is of mild steel or of nickel chrome or stainless steel, and the nut holding the impeller is made either of nickel chrome or stainless steel, according to the acid for which the pump is to be used. The pump is made both for belt and motor driven patterns. For sulphuric acid the pump casings are frequently of regulus metal. Heads up to 120 ft. are readily obtained in a single stage. Meldrum metal is proof against sulphuric, nitric, acetic and most other commercial acids, of any strength or temperature.

Cellulose Acetate Silk Co., Ltd.

A CIRCULAR just issued to shareholders in the Cellulose Acetate Silk Co., Ltd., recalls that at the last meeting on July 31 the shareholders were told that the company would soon be delivering acetate against a large contract, which stipulated a minimum annual quantity for delivery, giving an average sale of 2½ tons per day, or £232,000 per annum.

It is now stated, however, that a meeting of the customer's principal creditors was called and the company was later asked to reduce the contract price, but no decision was reached in view of the fact that the customer's financial resources available were not sufficient to provide the necessary working capital. The directors point out, however, that there is still a reasonable prospect that the customer will secure the necessary additional capital, and thereby require further supplies of acetate, failing which, it is stated, the company will have a considerable claim against this customer for loss of profits under the contract.

In the silk spinning department the additional plant has now been installed, and although certain difficulties have been encountered, sales during December far exceeded those for any previous month, while present indications are equally promising.

Referring to the action recently initiated by British Celanese, Ltd., against the company, the Non-Inflammable Film Co., Ltd., and Acetate Products Corporation, Ltd., the directors state that so far as can be ascertained there is no foundation for any of the allegations made, and that the company is taking definite steps to defend the action.

Durham University Extensions

EXTENSIONS to the Durham University Department of Pure Science, at Durham, with a floor space of 5,500 square feet, have just been completed, under the supervision of the University architect, Mr. W. T. Jones, F.R.I.B.A., and at a cost of £12,000. Well equipped physics laboratories and more lecture room accommodation are included among improvements made possible by the addition, and new physical chemical laboratories have resulted from internal reorganisation. A second part of the extension scheme is still to be carried out at a cost of about £18,000, but this will have to be delayed unless some benefactor assists the University authorities.

Scottish View of Chemical Trade

THE chemical trade is among the Scottish industrial activities reviewed in the latest issue of the official journal of Glasgow Chamber of Commerce. "Probably no trade," it is stated, "is so bound up with the welfare of other industries as the chemical trade, and on that account the prevailing depression has left its inevitable mark. On the other hand, however, trade reports show that chemical makers have fared better than other industries, and in the sphere of chemical research the past year has been one of progress."

Uses of Citric and Tartaric Acid

A PRIZE of 20,000 lire is offered for the best original paper on "New Uses of Citric and Tartaric Acid" by the Italian Chemical Association. Full particulars can be obtained from Associazione Italiana di Chimica, Roma (101), Via IV Novembre, 154.

Inquest on a Colour Mixer

Firm's Precautions Against Lead Poisoning

AT Camberwell Coroner's Court on Friday, January 23, before Mr. A. Douglas Cowburn and a jury, an inquiry was held into the death of William Charles James Humphrieson (32), a colour mixer, of Chapter Street, Walworth, London, S.E., who died in King's College Hospital on January 20 from the effects of lead poisoning. Dr. Bridges, Senior Medical Inspector of Factories, sat with the Coroner.

The widow stated that her husband had been working for 12 years with Pilchers and Co., Ltd., of Morgan's Lane, S.E., paint, varnish and colour manufacturers. On and off for the last two years he had been complaining of pains in his stomach, which he took to be indigestion.

Albert George Gamman, assistant works manager to Pilchers and Co., said that during the past 12 months Humphrieson had been engaged on the grinding of white lead. His duties were to receive several casks containing dried white lead, which he would shovel into the hopper. There would be a danger of dust flying about, but while he was working he would wear a respirator of a standard type. In the corner of the hopper there was a fan which operated while the machinery was in motion, and would carry off all the fumes that might come from the white lead into an airduct leading into a tank of water. As a further precaution, the firm made the men have an acid drink once a day, or as many times as they liked. No case of lead poisoning had come to his notice before this. With regard to the probability of white lead adhering to the workmen's skin, the firm had a constant supply of hot water and a quantity of soap, whilst hard bristle brushes were there for the men to clean their nails. The men were given five minutes before lunch time or closing time to wash their hands before their meal or before going home. Some men went home for lunch and others brought their meals, but they were not allowed to eat them other than in the messroom. The deceased had not been engaged on white lead work since December 12.

In answer to Dr. Bridges, witness agreed that the deceased came into contact with white lead, previous to the 12 months he had been engaged on this work, but only in another substance, not in its raw state.

Dr. Edward Pilkington, house physician at King's College Hospital, gave evidence to the effect that Humphrieson died from the effects of lead poisoning.

Mr. Plummer, a factory inspector, said that he certainly got a good impression from a short visit to the factory.

Without retiring, the jury brought in a verdict that the man had died from lead poisoning and that he had contracted it in the course of his work.

Accident Prevention

THE exercise of caution in dangerous chemical industries has already had a great effect in reducing the numbers of accidents, but there is still a considerable field for propaganda in this direction. The Accident Prevention and Welfare Publications, Ltd., of 321, High Holborn, London, have just issued an extremely useful booklet of 64 pages, intended for distribution among employees or clients, under the title of *Accident Prevention Calendar, 1931*. It has been compiled by experts in various British industries and contains many graphic and practical illustrations of the way in which accidents come about. Dangers of chemical and engineering works are naturally shown prominently, and there are several pages devoted to first aid hints. Single copies cost 4d. each, but there is a very substantial reduction for bulk orders.

Institution of the Rubber Industry

AT the ninth annual general meeting of the Institution of the Rubber Industry, held at the First Avenue Hotel, London, on Wednesday, Mr. Eric Macfadyen was re-elected president, and the following vice-presidents were chosen: Sir George Beharrell, Mr. George Beldam, Mr. A. Bendixsen, Sir Stanley Bois, Colonel J. Sealy Clarke, Mr. Hugh C. Coles, Lord Colwyn, Sir Eric Geddes, Mr. J. G. Hay, Mr. Alexander Johnston, Mr. L. V. Kenward, Mr. H. G. Montgomery, Mr. C. Paine, Mr. H. Rogers, Mr. P. Rosling, Sir Frank Swettenham, and Mr. D. F. L. Zorn. The honorary treasurer is again Mr. H. W. Franklin.

Chemical Engineers at Derby

A Successful Experiment

THE meeting of the Chemical Engineering group held at Derby on Friday, January 23, at which Mr. J. C. Farrant read a paper on "Modern Grinding" (a summary of which appeared in THE CHEMICAL AGE last week), was the first meeting of the group held in the provinces under their own auspices, and the experiment was pronounced a great success. The attendance, numbering about sixty, was representative, including members from London, Birmingham, Bristol, Nottingham, and Derby.

During the afternoon a visit of inspection was paid to the works of the Mining and Industrial Equipment Co., Ltd., and International Combustion, Ltd. (with which the former is associated). The party was conducted by Mr. J. C. Farrant (managing director of the Mining and Industrial Equipment, Ltd.), and Mr. Penny (works manager), and, following tea at the Friary Hotel, Derby, a meeting was held at which Mr. Farrant read his paper. Mr. George Gray of Bristol (chairman of the group), who presided, said there was a consensus of opinion that the experiment made for the first time by the group of holding a provincial meeting entirely under its own auspices had been thoroughly successful, and a recommendation would be made to the executive committee in London to repeat it. He apologised for the unavoidable absence of Mr. H. Talbot, Professor J. W. Hinchley, and Mr. W. A. S. Calder (vice-president). The members appreciated, he added, the consideration and courtesy shown by the two companies in allowing them to inspect their works, which had been alike instructive and enjoyable, and also the care with which the general arrangements for the meeting had been made by the honorary secretary of the group (Mr. W. F. Drake).

Professor Hinchley, in a communicated opinion, thought Mr. Farrant's classification of materials and of machines extremely good, and that nothing could better his attempt to follow the problems of grinding in a scientific way. He preferred the term "size reduction" to that of "grinding." Mr. Farrant's attempt to estimate the effect of moisture and atmospheric humidity was most valuable.

Dr. Cullen said he warmly supported the suggestion put forward by Mr. Farrant as to the need of closer co-operation between the pure scientist, the technician, and the manufacturer. He believed further progress would be made with an increased disposition on the part of makers of plant to give information as to costs and other data.

Mr. A. A. King said that one of the problems which faced the chemical manufacturer was to obtain the right kind of mill for grinding certain classes of material. The manufacturer, faced with the problem of milling, ought to be in a position to obtain the kind of mill that would give a definite particle size for a specified material, without having to gain such information from experience with the equipment he had installed.

Mr. Russell and Dr. Firth (Nottingham Society of Chemical Industry) also spoke, and a hearty vote of thanks to Mr. Farrant was passed.

New York Chemical Exposition

DURING the week May 4 to 9 inclusive, 1931, the thirteenth Exposition of Chemical Industries will be held in New York. A students' course upon the fundamentals of chemistry and chemical engineering will again be instituted under the chairmanship of Professor W. T. Read, Dean of Chemistry at Rutgers University. The exposition will include three floors of exhibits of raw materials suitable for the manufacture of chemicals and chemical products, various other technical products used in the arts and industries, apparatus and equipment, machinery, and finished chemical products. The machinery and apparatus will include laboratory equipment, instruments of precision for recording temperature, pressure, volume, flow, etc., and apparatus and equipment in large scale operations. In many cases whole processes will be shown in operation.

The operations to be illustrated include disintegration, crushing, grinding, grading, mechanical separation, filtration, classification, settling, thickening, evaporation, distillation, drying, weighing, measuring, etc. An important section will be that devoted to metals and alloys.

Chemical Matters in Parliament

Dyestuffs Import Regulations

MR. G. MANDER in the House of Commons on January 27 asked the President of the Board of Trade if he was proposing to take steps to revise the terms of appointment of the committee set up under the Dyestuffs Import Regulation Act, with a view to carrying out the undertakings given that dyes will be available in the home market of the same quality and on the same terms as foreign dyes.

Mr. W. Graham: The committee to which the hon. Member referred is an advisory committee constituted in accordance with the provisions of Section 2 (3) of the Dyestuffs (Import Regulation) Act, 1920. It has no special terms of reference. The House will remember that during the recent discussions on the future of this Act, the dyestuff makers declared their willingness to agree that applications for licences to import, on the ground of differences between the prices quoted by British and foreign makers respectively, should be granted if British makers would not supply at the foreign prices, so long as such prices were not what they termed dumping prices. I assumed (and I may say that the advisory committee agreed) that the makers in using the word "dumping" in this connection had regard to the possibility of foreign makers offering dyes for use in this country at prices below those at which they were selling in other countries. In the circumstances, I suggested to the committee that the grant of licences should henceforth be in accordance with that principle, and that the onus of proof that the foreign prices quoted are of the nature of "dumping" prices should rest with the British makers. The committee unanimously agreed that this procedure should be adopted.

British Bitumen Emulsions, Ltd.

A CIRCULAR to shareholders of British Bitumen Emulsions, Ltd., states that the attention of the board has been drawn to the fact that the previous letter calling a meeting to authorise an increase in the capital may have been misunderstood. The position which the board desired to place before the shareholders is that International Bitumen Emulsions Corporation agreed to subscribe for the purposes of the company's business the further capital required to give the corporation a controlling interest. An additional £25,000 is considered sufficient for present needs, and the corporation has agreed to subscribe for 100,542 shares at par, which will provide a sum of £25,135 for further working capital. In addition, the corporation will become entitled to an allotment of a further 34,000 fully-paid shares under the terms of the licence agreement.

The Late Mr. Thomas Butler

THE death occurred on Tuesday, January 20, of Mr. Thomas Butler, for a long period managing director of William Butler and Co. (Bristol), Ltd., chemical manufacturers and importers and distillers of tar, rosin, and petroleum. Mr. Butler, who was 69, occupied a prominent position in the commercial and public life of Bristol and took a very keen interest in philanthropic and missionary efforts. The business, which was founded by his father, was incorporated as a private company in 1905, and Mr. Butler became one of the directors, having for colleagues his two brothers, Mr. W. H. Butler, Lt.-Col. J. B. Butler, and other members of the family. He retired some years ago, and was succeeded by his son, Dr. T. Howard Butler.

"C.A." Queries

We receive so many inquiries from readers as to technical, industrial, and other points, that we have decided to make a selection for publication. In cases where the answers are of general interest, they will be published; in others, the answers will simply be passed on to the inquirers. Readers are invited to supply information on the subjects of the queries :—

162. (*Evaporators.*) An Italian company wish to be put in touch with the British constructors of the "Kaufmann" vacuum evaporators.

From Week to Week

THE TELEPHONE NUMBER of Kaylene, Ltd., Waterloo Road, North Circular Road, Cricklewood, London, has been changed to Gladstone 1071.

THE NICHOLS MEDAL, awarded annually by the New York section of the American Chemical Society, is to be presented to Mr. John Arthur Wilson, of Milwaukee, Wis., at a meeting to be held on March 15.

UNIVERSITY NEWS.—*London.*—The degree of D.Sc. in chemistry, of the University of London, has been conferred on Mr. A. M. Ward, an internal student of Birkbeck College, and that of D.Sc. in Physics on Mr. S. H. Piper, an internal student of King's College.

MR. F. A. SZARVASY was appointed chairman of Amalgamated Anthracite Collieries, Ltd., in succession to the late Lord Melchett at a meeting of the board on Tuesday. Lord Melchett was appointed a deputy-chairman of the company, with Sir David R. Llewellyn, and Mr. W. M. Llewellyn was invited to join the board to fill the vacancy.

A GENERAL MEETING of Metallgesellschaft at Frankfort has elected Mr. Oliver Lyttelton, a director of the British Metal Corporation, and Mr. Walter Gardner, a director of Henry Gardner and Co., Ltd., of London, as directors. The Amalgamated Metal Corporation, Ltd., which holds the shares of the British Metal Corporation, Ltd., and Henry Gardner and Co., Ltd., in August last year carried out an exchange of shares with the Metallgesellshaft and the Société Générale des Minerals.

THE CHEMICAL AND METALLURGICAL CORPORATION announces that all matters, the subject of litigation between the corporation and Mr. Stanley Smith, late managing director, have been amicably settled by mutually satisfactory arrangement between the parties. It will be recalled that on February 6, 1930, legal proceedings were commenced against Mr. Smith with the object of obtaining a rescission of his various agreements with the company, including an agreement relating to a sole selling agency for the company's chemical products.

BRISTOL UNIVERSITY was recently offered £50,000 for the endowment of research in experimental and theoretical physics at the Henry Herbert Wills Physics Laboratory on condition that a further contribution of £25,000 was secured from other sources. Mr. Melville Wills, already a benefactor to the university, has offered to meet this condition by the gift of £25,000, in memory of his late brother, the founder of the laboratory. One portion of the Rockefeller gift will be devoted to researches in molecular structure and the borderland of physics and chemistry, to which the laboratory has already contributed on both the theoretical and experimental sides.

RECENT WILLS include: Mr. Henry Lewis Doulton, formerly chairman of the pottery company of Doulton and Co., of Lambeth (net personalty £627,435) £639,358. Among his bequests were £500 to the Pottery and Glass Trades Benevolent Society, and £2,000 to his executors for persons in the employ of Doulton and Co. Mr. Edward Sainsbury, founder and proprietor of the Bristol firm of oil-cake merchants (net personalty £4,162), £9,234. Sir Otto Beit left £3,784,342 with net personalty £3,651,247, his bequests including £25,000 to the Imperial College of Science and Technology, London, and £8,000 to Strangeway's Research Laboratory, Cambridge. £290,000 has been left to his executors for charitable distribution.

AN AMALGAMATION SCHEME affecting the famous Sheffield steel firms of John Brown and Co., Ltd., and Thomas Firth and Sons, Ltd., was announced on Wednesday night. In a circular to the John Brown debenture holders it is announced that a merger has now been arranged with Thomas Firth and Sons by the sale and transfer by John Brown and Co. to Thomas Firth's of that section of its business which includes the Atlas Works and Scunthorpe Works and certain other assets. It is proposed, for the purpose of carrying into effect the amalgamation, to increase the ordinary share capital of Firth's by the creation of 450,000 new ordinary shares of £1 each, deferred in regard to dividends to the payment of a 5 per cent. dividend in each year on the existing issued Ordinary share capital.

SIR ERNEST RUTHERFORD, who received a Barony in the New Year Honours List is to become Baron Rutherford of Nelson, of Cambridge, in the county of Cambridge.

TWO FURTHER BOOKLETS have been issued by the Department of Overseas Trade in their series of hints for commercial visitors overseas, the latest volumes dealing with the Canary Islands (Ref. No. C. 3,433) and Spain (Ref. No. 3,424).

MR. W. L. BROWN, who has just been appointed Director of Education in the borough of Eccles, Lancashire, is a science honours graduate of Armstrong College, Newcastle, where he was awarded the Freiere Marreco medal for research work in chemistry.

PLATINUM DEPOSITS, described as the richest in the world, are reported to have been discovered on the island of Chiloe, Chile. It is claimed that the yield of metal is from 12 to 14 grams per ton and tests in England and Germany are said to confirm this claim.

A LARGE BOILER PLANT ORDER, amounting to nearly £700,000, has been placed by the County of London Electric Supply Co., with Babcock and Wilcox, Ltd., for boiler plant for Barking Power Station in connection with the Electricity Board's grid scheme.

THE DEVELOPMENT of the urban district of Billingham has been abnormal, the population having more than doubled, and the rateable value nearly trebled, during the past seven years, stated the Clerk to Durham County Council on the subject of the proposed Borough Extensions Bill last week.

A JOINT MEETING of the Bristol and South Western Counties section of the Institute of Chemistry and the Bristol University Chemical Society was held in the University on Thursday, January 22, when Mr. R. Leslie Collett, Assistant Secretary of the Institute of Chemistry, delivered an address on "Personal and Professional Aspects of a Chemist's Career."

A BOARD OF TRADE notice states that anhydrous hydrocyanic acid, which is to continue exempt from Key Industry Duty until June 20, 1931, may on importation be entered on Form No. 23 (Sale), on which, in addition to the usual particulars, are to be inserted the words "Exempt from Key Industry Duty under Treasury Order of December 17, 1930."

A STRONG PROTEST against the standard of wages paid to Corporation employees, as compared with the rates paid to the same classes in competitive industries, has been sent to the Town Clerk of Glasgow by 27 employers' organisations, claiming to cover the principal competitive industries in the West of Scotland. Among the signatories is the Scottish Association of Chemical Manufacturers.

R. M. CATTERSON-SMITH, designers and manufacturers of electric furnaces, kilns and heaters, at present of Lacland Place, 429B, King's Road, Chelsea, announce that they have built a new factory, and after today (January 31) their address will be Adams Bridge Works, Exhibition Grounds, Wembley, Middlesex, to which all communications should be sent. Telegrams and cables: Leckiln, Wembley.

MEMBERS of the South Wales section of the Society of Chemical Industries and of the University of Wales (Swansea) Chemical Society last week visited the Ynisedwyn Colliery, controlled by Amalgamated Anthracite Collieries, to inspect the new clean coal plant which has been installed. They were conducted around by Dr. R. Lessing, managing director, who explained the general purifying process, and afterwards gave an address.

DR. CHARLES L. REESE, formerly director of the Chemical Department of E. I. du Pont de Nemours and Co., Inc., Wilmington, U.S.A., and more recently its chemical consultant, retired from active sevice with the company on January 1. Dr. Reese had been connected with the du Pont Co. since June 1, 1902, when he became chief chemist of the Repauno Works. A general chemical department for the entire company was established in 1911, and Dr. Reese was made its director. He remained in that position until May, 1924, when he became chemical consultant.

Obituary

MR. JAMES KELLY, of Liverpool, late with Ayrton, Saunders and Co., on January 19.

MR. JOHN DONE, for 52 years in the employ of the United Alkali Co., aged 75.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

338,747. DYES. I.G. Farbenindustrie Akt.-Ges, Frankfort-on-Main, Germany. International Convention date, December 4, 1928.

A 3 : 4 : 8 : 9-dibenzpyrene-5 : 10-quinone or a 4 : 5 : 8 : 9-dibenzpyrene-3 : 10-quinone, or a ketone capable of being transformed into such a pyrene-quinone by ring closure, is treated in an alkali-aluminium chloride melt with a halogen or halogenating agent. In an example, 1 : 5-dibenzoyl-naphthalene is converted into the dibenz-pyrene-quinone in a sodium-aluminium chloride melt while introducing oxygen as in specification 293,768 (see THE CHEMICAL AGE, Vol. XIX, p. 243) and bromine is then introduced to obtain a dibrom derivative. This may be oxidised with alkali hypochlorite, and gives golden orange dyeings identical with those of specification 310,891 (see THE CHEMICAL AGE, Vol. XXI, p. 10). Other examples are also given.

338,764. DYE INTERMEDIATES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges, Frankfort-on-Main, Germany. Application date, December 16, 1929. Addition to 319,593.

Benzanthrones containing the group—C H aryl C N in the 2-position described in specification 319,593 (see THE CHEMICAL AGE, Vol. XXI, p. 407) are treated with oxidising agents in the presence of organic diluents. Thus, the condensation product from benz-anthrone and benzyl cyanide is oxidised to obtain 2-benzoyl-benz-anthrone.

338,807. HYDROGENATION OF PARALDOL. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, January 30, 1929.

Paraldol is hydrogenated at 30°–50° C. in the presence of a solvent or diluent such as water, ethanol, isopropanol or butanol, and a hydrogenation catalyst such as nickel or copper deposited on pumice or kieselguhr. The product is 1 : 3-butylene-glycol.

338,854. OXYGENATED ORGANIC COMPOUNDS. H. Dreyfus, 22, Hanover Square, London. Application date, July 24, 1929.

Mixtures of hydrogen and oxides of carbon, such as water-gas, coke-oven gas, or producer gas, are heated in a chamber of copper or copper-lined steel, or steel containing molybdenum, tungsten, manganese, cobalt or nickel, to 200°—600° C. at a pressure of 50—500 atmospheres, in the presence of catalysts consisting of alkali or alkaline earth or copper silicates, borates or phosphates. The products vary according as the catalysts contain an excess of basic or acidic radicles, and consist of ethanol, propyl alcohol, acetaldehyde, acetic acid, methyl acetate and their higher homologues, and ketones. Instead of hydrogen and oxides of carbon, synthesised products such as methanol or ethanol may be used, and may be previously prepared.

338,858. DYES. Chemische Fabrik vorm. Sandoz, Basle, Switzerland. International Convention date, December 20, 1928.

Water-soluble products for wool dyeing and printing, giving fast blue to greenish-blue shades, are obtained by treating with sulphite an arylamino-anthraquinone containing in the benzene ring to which is attached the aryl-amino group a halogen atom in a β-position and in the other benzene residue a sulphonic acid group. The β-halogen atom is thus replaced by a sulpho group. Examples are given of the application of the process to 1-amino 2-bromo-4-anilido-and 4-*p*-amino-acetanilido-anthraquinone-5-sulphonic acid, 1-amino-2-bromo-4-anilido-anthraquinone 8-sulphonic acid, 1-amino-2-bromo-4-*p*-toluido-anthraquinone-5-sulphonic acid, 1-amino-2-bromo-4-(2¹-sulpho-4¹-methylanilido)-anthraquinone-5-sulphonic acid and 1-amino-2-bromo-4-(3¹-sulpho-4¹-methylanilido)-anthraquinone-5-or 8-sulphonic acid.

338,869. AMMONIUM SULPHATE AND OTHER FERTILISERS. R. Tern, Villa Johanna Zinnowitz, near Usedom, Germany. Application date, August 22, 1929.

A mixture of gas obtained by roasting crude sulphur or spent oxide from gas works, and ammoniacal gases obtained by heating liquor from scrubbers, is ionised by subjection to a high tension current at 70,000—80,000 volts. The resulting reaction yields a product containing all the nitrogen and consisting of ammonium sulphate, sulphite, imido-sulphonate, etc.

338,886. TREATING SULPHIDE ORES. National Processes, Ltd., 95, Gresham Street, London, and T. B. Gyles, 8, Kennington Avenue, Bishopston, Bristol. Application date, August 27, 1929.

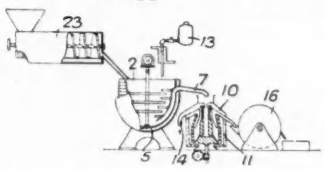
Sulphide ore is mixed with coarse granular material such as sinter ore from the previous operation treated so that it contains zinc sulphate, and with a small quantity of the sulphate or sulphite of a metal other than iron or an alkali or alkaline earth metal, and is then blast-roasted or sintered in the presence of sulphurous gases.

338,891. DYES. D. A. W. Fairweather, J. Thomas, and Scottish Dyes, Ltd., Earl's Road, Grangemouth. Application date, May 25, 1929.

Indanthrone is obtained by oxidising 2-amino-anthrahydroquinone-9:10-disulphuric ester by means of cupric sulphate or cupric chloride in some cases with the addition of caustic soda or hydrochloric acid. The use of cupric salts avoids over-oxidation and less than the full quantity required for complete oxidation, may be employed.

338,938. CHROMIC ACID AND SODIUM BISULPHATE. C. Arnold, London. From Harshaw Chemical Co., 1,000, Newburgh Avenue, Ohio, N.J., U.S.A. Application date, July 30, 1929.

Sodium bichromate is supplied from an electrically heated preheater, 23 and oleum is supplied from a tank 13 to a mixing

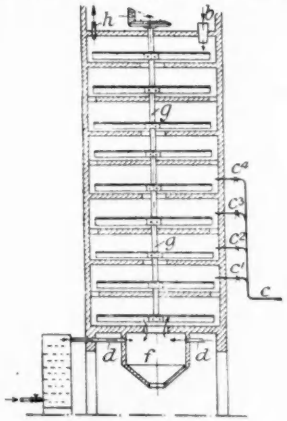


338,938

vessel 2, which is heat insulated and electrically heated. The molten reaction products pass through pipe 7 to a centrifugal separator 10 which is heat insulated and electrically heated. Sodium bisulphate is drawn off at 14 and chromic acid passes on to a rotating drum where it solidifies. Alternatively, the chromic acid and sodium bisulphate may be separated by settlement.

338,940. BLEACHING POWDER. E. Krebs, 15, Ovre Voldgate, Oslo, Norway. Application date, July 30, 1929.

Lime is supplied through a hopper *b* into the top of a vertical



338,940

shelf absorber having a number of compartments each having a rotary stirrer mounted on a common shafting. Air is supplied to the absorber through pipe *d* and chlorine is supplied

through a number of pipes c^1, c^2, c^3, c^4, above the air inlet. The air is maintained at constant humidity and temperature, and the chlorine is previously dried. The gases are withdrawn at *h* and may be recirculated, and the bleaching powder passes out through the hopper *f*.

338,981. HALOGENATED PHOSPHORUS AND PHOSPHORIC ESTERS. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 31, 1929.

These esters are obtained by treating a compound containing an alkylene oxide group with a phosphorus trihalide or oxyhalide in the presence of a catalyst consisting of iodine, ferric chloride, sulphur or iron filings. In the case of ethylene oxide and phosphorus trichloride, the oxygen bridge is opened and a chlorine atom combines with a CH_2 group, while the phosphorus atom combines with the oxygen. Ethylene oxide may thus be attached up to three times, so that neutral ω-chloro-ethylester of phosphorus acid may be obtained. Other examples describe the treatment of epichlorhydrin with phosphorus oxychloride and phosphorus tribromide.

339,011. FATTY OILS. H. Hatakeyama and H. Watanabe, 82, Miyamotodori 5-chome, Kobe, Japan. Application date, September 12, 1929.

Vegetable oils are treated to remove most of the free fatty acids and glycerine, and the remaining fatty acid is esterified with an aromatic alcohol. In an example olive oil is decolorised, emulsified with water and allowed to stand. The oil layer is removed, washed with water, dehydrated and heated on a water bath with 3 per cent. of benzyl, phenyl, ethyl, oxybenzyl or cinnamic alcohol to esterify traces of fatty acid. The water produced is removed by passing through the liquid a current of carbon dioxide which has been dried by sulphuric acid, and the oil is distilled under reduced pressure to remove excess of alcohol.

339,028. TREATING SILICATES. F. Jourdan, 2, Via Pisanella, Rome. International Convention date, October 22, 1928.

Natural silicates such as leucite, volcanic tuffs, peperino, puzzolana, china clay, and silicates of aluminium and magnesium are treated with hydrochloric, sulphuric, or nitric acid at a temperature above 100° C. in the presence of a quantity of the same salt which is finally produced. By this means the silica content of the solution obtained is reduced to a minimum. The reaction is effected in a pressure vessel at 10—15 atmospheres.

339,029. DYES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, September 24, 1929.

The dyes obtained by coupling a diazotised *p*-nitraniline derivative negatively substituted in *o*-position to the NH_2 group or a homologue with a compound of the diphenylamine series, *e.g.*, diphenylamine or a sulpho or carboxy derivative, are sulphonated with oleum to obtain monoazo dyes which dye leather brown shades. Examples are given of the sulphonation of the dyestuffs 2 : 6-dichlor-4-nitraniline or 2-chlor-4-nitraniline→diphenylamine and 2-chlor-4-nitraniline→*p*-diphenylamino monosulphonic acid.

339,032. ACID-RESISTING APPARATUS. H. Frischer, 91, Kerpenerstrasse, Lindenthal, Cologne, Germany. Application date, September 26, 1929.

Vessels for containing or treating nitric acid are constructed of an aluminium alloy containing magnesium or silicon for the parts in contact with the liquid, and of a more resistant alloy such as iron-silicon (*e.g.*, "Durion," "Thermosilicid" and "Antacid") or chromium-nickel for the parts exposed to the fumes.

339,045. FORMIC ACID. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij, 30, Carel van Bylandtlaan, The Hague. International Convention date, October 31, 1928.

Aqueous formic acid of 85 per cent. strength and orthophosphoric acid of 1·7 specific gravity are distilled together at 12 mm. pressure to obtain concentrated formic acid. The distillate is collected in six fractions varying in strength from 97·5 per cent. to 26 per cent.

339,048. DESTRUCTIVE HYDROGENATION. Gutehoffnungshütte Oberhausen Akt.-Ges., Oberhausen, Rhineland, Germany. International Convention date, October 8, 1928.

Fatty oils are converted into motor spirit by hydrogenating them above their boiling points at a pressure less than 45 atmospheres, and in the presence of catalysts such as copper, iron or zinc. In an example, soya bean oil is hydrogenated by means of illuminating gas at 500° C. in the presence of a catalyst obtained by treating iron oxide with sodium carbonate solution, drying and reducing the mixture. The product contains 78 per cent. of benzine-like hydrocarbons.

339,093. VINYL HALIDES AND ETHYLIDENE HALIDES. Consortium für Elecktrochemische Industrie Ges., 20, Zielstattstrasse, Munich, Germany. International Convention date, November 19,1928.

A mixture of acetylene and dry hydrogen chloride is passed over a catalyst consisting of a compound of an alkaline earth metal, magnesium, bismuth, antimony, vanadium, zinc, aluminium, iron or mercury, mounted on a carrier such as active carbon or silica gel, to obtain addition compounds. Several examples of the preparation of the catalyst are given.

339,135. SYNTHETIC RUBBER. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date. December 20, 1929.

Diolefines are polymerised by means of an alkali metal in the presence of at least 25 per cent. of dimethyl, diethyl or methyl-ethyl ether, which act as catalysts and diluents; the products vary according to the conditions. With 50 per cent. of an ether and 0·1–0·5 per cent. of alkali metal, a strong product is obtained at 30° C.; with 1 part butadiene, 2 parts ether, and 0·5 per cent. sodium a soft product is obtained, and with 1 part butadiene, 1 part butyl ether and 2 per cent. sodium at 60° C. a soft plastic product is obtained.

Specifications Accepted with Date of Application

318,146. Triazo dyes, Preparation of. E. I. Du Pont de Nemours and Co. August 28, 1928.

318,834. Colour Lakes, Manufacture of. I.G. Farbenindustrie Akt.-Ges. September 8, 1928.

340,939. Aliphatic acids and esters, Manufacture of. H. Dreyfus. October 1. 1929. Addition to 319,030.

340,984. Oxygen-containing derivatives of unsaturated hydrocarbons, Recovery of—from mixtures thereof with other substances. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) July 30, 1929.

340,949. Hydrocarbon oils, Apparatus for the treatment of. W. W. Triggs. (*Panhandle Refining Co.*) June 29, 1929.

340,024. Diphenyl, Preparation of. F. X. Govers. November 5, 1928.

341,031. Aliphatic acids, Manufacture of. H. Dreyfus. September 6, 1929.

341,047. Nitrogen compounds having hydrogenated ring systems, Manufacture of. I.G. Farbenindustrie Akt.-Ges. October 15. 1928. Addition to 300,130.

341,053. Wetting, cleansing and dispersing agents, Production of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) August 7, 929.

341,054. Zinc base alloys. New Jersey Zinc Co. March 12, 1929.

341,060. Eliminating iron from inorganic materials. Vereinigte Stahlwerke Akt.-Ges. October 12, 1928.

341,069. Destructive hydrogenation. B. R. Goodfellow, L. Patrick, K. Gordon, and Imperial Chemical Industries, Ltd. October 4, 1929.

341,074. Ethers of vinyl alcohol, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) October 7, 1929. Addition to 332,605.

341,120. 6-aryl-amino-2-naphthols, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) October 15, 1929.

341,130. Oxidation products from hydrocarbon materials, Manufacture of. C. Arnold. (*Standard Oil Development Co.*) October 19, 1929.

341,140. Drying of chemical and similar products. Sachtleben Akt.-Ges. für Bergbau und Chemische Industrie. October 25, 1928.

341,147. Cellulose derivatives, Manufacture of. British Celanese, Ltd. October 26, 1928.

341,153. Carrying out reactions with hydrogen and apparatus therefor. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) October 30, 1929.

341,158. Esters, Manufacture of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) October 31, 1929.

341,160. Products containing aluminium oxide and one or several sulphides, Manufacture of. International Patent Corporation Co. November 2, 1928.

341,167. Alcohols, Manufacture of. H. D. Elkington. (*Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij.*) November 6, 1929.

341,224. Dyestuff of the thionaphthene-indole-indigo series, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) December 5, 1929.

341,229. Vat-dyestuffs from dibenzanthrone and iso-dibenzanthrone, Manufacture of. S. Percival. (*A.C.N.A. Azienda Chimiche Nazionali Associate, and Belloni and Colli.*) December 10, 1929.

341,233. Granular active carbon, Manufacture of. I.G. Farbenindustrie Akt.-Ges. December 13, 1928.
341,237. Cellulose derivatives, Manufacture of. Soc. of Chemical Industry in Basle. December 15, 1928.
341,246. Electro-deposition of metals. S. O. Cowper-Coles. December 27, 1929.
241,299. High-percentage calcium cyanamide, Preparation of. N. Caro and A. R. Frank. February 8, 1929.
341,349. Materials in granular form, Manufacture of. Imperial Chemical Industries, Ltd. (*Grasselli Chemical Co.*) April 4, 1930.
341,357. Vat-dyestuffs, Manufacture of. I.G. Farbenindustrie Akt.-Ges. April 15, 1929.
341,358. Sulphite liquor spirit, Treatment of. Zellstofffabrik Waldhof and M. Gade. April 24, 1929.
341,386. Calcium carbamate, Production of. N. Caro and A. R. Frank. February 8, 1929.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

Akt.-Ges. für Stickstoffdünger. Manufacture of shaped calcium oxide. 1,726. January 19. (Germany, January 17, 1930.)
Battye, A. E. Production of aldehyde condensation products. 2,241. January 23.
Baxter, J. P., and Imperial Chemical Industries, Ltd. Production of catalysts for synthesis of methane. 2,076. January 21.
Blanc, G. A. Treatment of leucite, etc., with nitric acid. 1,887. January 20.
—— Production of aluminium oxide from aluminium nitrate. 1,888. January 20.
Boehringer and Soehne, Ges. Separation of acetic anhydride, acetic acid, and water. 1,742. January 19. (Germany, January 18, 1930.)
Bozel Maletra, Soc. Industrielle de Produits Chimiques. Manufacture of dichromates. 2,342. January 23. (France, August 14, 1930.)
—— Manufacture of chromates and dichromates. 2,343. January 23. (France, May 9, 1930.)
Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of pyridine derivatives. 1,776. January 19.
—— Manufacture of nitrogenous vat dyestuffs. 2,091. January 21.
—— Printing cotton. 2,094, 2,095. January 21. (August 21, 1929.)
—— Manufacture of vat and sulphur dyestuff preparations for textile printing. 2,440. January 24.
—— Manufacture of thioindigoid dyestuffs. 2,441. January 24.
Deutsche Gasolin Akt.-Ges. Working up residues obtained when mineral oils are distilled over alkalies, etc. 1,862. January 20, (Germany, January 23, 1930.)
Du Pont de Nemours and Co., E. I. Vinyl derivatives. 1,924. January 20. (United States, January 20, 1930.)
Fawcett, E. W., and Imperial Chemical Industries, Ltd. Hydrogenating non-cyclic alcohols. 2,355. January 23.
Gutehoffnungshütte Oberhausen Akt.-Ges. Production of formaldehyde. 1,865. January 20. (Germany, January 20, 1930.)
Hofwimmer, F., and Meissner, J. Working up waste acids formed during production of nitro-compounds. 2,019. January 21.
Horsley, G. F., and Imperial Chemical Industries, Ltd. Production of butyraldehyde. 2,074, 2,075. January 21.
I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of threads, foils, etc. 1,717. January 19.
—— Manufacture of motor fuels. 1,718. January 19.
—— Catalysts. 2,047. January 21.
—— Separation of finely-divided solid substances from tars, oils, etc. 2,048. January 21.
—— Destructive hydrogenation of carbonaceous materials. 2,059. January 21.
—— Manufacture of acetylene and carbon black. 2,186. January 22.
—— Manufacture of acetylene. 2,187. January 22.
—— Carrying out reactions in periodically heated chambers. 2,424. January 24.
—— Production of sulphur. 2,425. January 24.
—— Production of fatty acids. 2,426. January 24.
I.G. Farbenindustrie Akt.-Ges., and Mond, A. L. Preventing sedimentation and gelatinisation of solutions of driers in volatile organic solvents. 2,058. January 21.
I.G. Farbenindustrie Akt.-Ges. Impregnating and stiffening fibrous materials. 1,727. January 19. (Germany, January 18, 1930.)
—— Manufacture of derivatives of cellulose. 2,044. January 21. (Germany, January 21, 1930.)
—— Manufacture of vat dyestuffs. 2,332. January 23. (Germany, January 25, 1930.)
Imperial Chemical Industries, Ltd., and Stubbings, W. V. Catalytic reduction of indigo. 1,936. January 20.
—— Manufacture of fertilisers. 2,031. January 21. (United States, January 21, 1930.)
—— Casting metals. 2,077. January 21.
—— Installation for forcing fluid into receiver. 2,144. January 22.
—— Manufacture and production of fertilisers. 2,349. January 23. (United States, January 24, 1930.)
Kreis, E. S., and Technical Research Works, Ltd. Preparation of leuco bases of dyestuffs. 1,663. January 19.
Lush, E. J., and Technical Research Works, Ltd. Preparation of dye baths. 1,662. January 19.
Naugatuck Chemical Co. Treatment of rubber. 1,954. January 20. (United States, March 18, 1930.)
Newport Chemical Corporation. Colour-printing paste. 1,792. January 19. (United States, February 6, 1930.)
Newport Co. Preparation of 1-amino-4-halogen-9-anthrone and substitution products, etc. 2,322. January 23. (December 16, 1929.) (United States, January 2, 1929.)
Saunders, K. H. Catalytic reduction of indigo. 1,936. January 20.
Soc. des Mines de Dourges. Producer gas generation from by-products of hydrogen manufacture. 2,013. January 21. (France, February 28, 1930.)
—— Integral transformation of coke oven gas, etc., into ammonia and methyl alcohol. 2,014. January 21. (France, February 28, 1930.)
Soc. L'Air Liquids Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude. Preparation of acetylene, hydrogen, etc. 2,086. January 21. (Germany, March 17, 1930.)
Soc. of Chemical Industry in Basle. Manufacture of chromiferous azo dyestuffs. 2,330. January 23. (Switzerland, January 23, 1930.)
—— Production of fast tints on artificial silk. 2,331. January 23. (Switzerland, January 23, 1930.)
Standard Oil Development Co. Method of producing esters from olefines. 1,856. January 20. (United States, January 21, 1930.)
Tootal Broadhurst Lee Co., Ltd., and Wood, F.C. Production of aldehyde condensation products. 2,241. January 23.

Drop in United States Rayon Production

THE production of rayon in the United States during 1930 was considerably less than during the preceding year. According to estimates, both official and unofficial, the output of all companies, including yarn made by all four processes, amounted to 110,208,000 lb., as against 121,566,000 lb. for 1929.

This, divided into processes, shows the production as follows: Viscose and nitro-cellulose processes, 99,758,000 lb.; cellulose acetate yarn, 8,650,000 lb.; and cuprammnonium, 1,800,000 lb.

Indicated consumption for the year of domestic yarn is about 95,000,000 lb., and imported yarn about 5,000,000 lb. This would bring total consumption of rayon during the year to about 100,000,000 lb., as against about 130,000,000 lb. for 1929. This is a sum lower than for any year since 1926, being approximately comparable to 1927, in which year there were 75,000,000 lb. produced, 16,000,000 lb. imported, and 10,000,000 lb. carried over from 1926, all of which was consumed in 1927.

While the carry-over into 1931 is larger than last year, the rate of production at present is considerably less than then, some of the organisations having run at capacity for quite some weeks in 1930 before starting to curtail production. Production schedules for the industry are said to average less than for the early part of 1930.

Tin Research during 1930

DETAILS of tin research during 1930, which has brought about important new industrial uses of the metal, were announced last week by Colonel Heckstall-Smith, Hon. Secretary of the Tin Research and Industrial Applications Committee of the Tin Producers' Association. The most important lines of research, he stated, have been concentrated on tin coatings, ternary alloys, white metal bearings, corrosion, and the tinning of cast iron. The last-named is a task which has long perplexed engineers, and is of great importance for the bearings of Diesel engines and in other machinery. With regard to tin coatings, the object is to cheapen manufacturing costs for tinplate and expand the industry.

The actual research work, it is stated, was undertaken by the British Non-Ferrous Metals Research Association. The committee is also indebted to the investigations made by the National Research Laboratory.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£18 15s. per ton d/d address U.K. in casks.
ACID CHROMIC.—1s. per lb., less 2½% d/d U.K.
ACID HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d, according to purity, strength and locality.
ACID NITRIC, 80° Tw.—Spot, £20 to £25 per ton makers' works, according to district and quality.
ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
AMMONIA (ANHYDROUS).—Spot, 10d. per lb., d/d in cylinders.
AMMONIUM BICHROMATE.—8½d. per lb. d/d U.K.
BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.
BLEACHING POWDER, 35/37%.—Spot, £7 19s. per ton d/d station in casks, special terms for contracts.
BORAX, COMMERCIAL.—Crystals, £13 10s. per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags. carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards).
CALCIUM CHLORIDE (SOLID), 70/75%.—Spot, £4 15s. to £5 5s. per ton d/d station in drums.
CHROMIUM OXIDE.—9d. to 9½d. per lb. according to quantity d/d U.K.
CHROMETAN.—Crystals, 3½d. per lb. Liquor, £18 12s. 6d. per ton d/d U.K.
COPPER SULPHATE.—£25 to £25 10s. per ton.
METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 7d. to 1s. 11d. per gall. pyridinised industrial, 1s. 9d. to 2s. 1d. per gall.; mineralised, 2s. 8d. to 2s. 11d. per gall. 64 O.P., 1d. extra in all cases. Prices according to quantity.
NICKEL SULPHATE.—£38 per ton d/d.
NICKEL AMMONIA SULPHATE.—£38 per ton d/d.
POTASH CAUSTIC.—£30 to £33 per ton.
POTASSIUM BICHROMATE CRYSTALS AND GRANULAR.—4½d. per lb. nett d/d U.K., discount according to quantity; ground ½d. per lb. extra.
POTASSIUM CHLORATE.—3½d. per lb., ex-wharf, London, in cwt. kegs.
POTASSIUM CHROMATE.—8½d. per lb. d/d U.K.
SALAMMONIAC.—Firsts lump, spot, £40 17s. 6d. per ton d/d address in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.
SALT CAKE, UNGROUND.—Spot, £3 10s. per ton d/d station in bulk.
SODA ASH, 58%.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.
SODA CAUSTIC, SOLID, 76/77%.—Spot, £14 10s. per ton, d/d station.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2-cwt bags.
SODIUM ACETATE 97/98%.—£21 per ton.
SODIUM BICARBONATE, REFINED.—Spot, £10 10s. per ton d/d station in bags.
SODIUM BICHROMATE CRYSTALS (CAKE AND POWDER)—3¾d. per lb. nett d/d U.K., discount according to quantity. Anhydrous ¾d. per lb. extra.
SODIUM BISULPHITE POWDER, 60/62%.—£16 10s. per ton delivered 1-cwt. iron drums for home trade.
SODIUM CHLORATE.—2¾d. per lb.
SODIUM CHROMATE.—3⅝d. per lb. d/d U.K.
SODIUM NITRITE.—Spot, £19 per ton, d/d station in drums.
SODIUM PHOSPHATE.—£14 10s. per ton, f.o.r. London, casks free.
SODIUM SILICATE, 140° Tw.—Spot, £8 5s. per ton, d/d station returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—Spot, £4 2s. 6d. per ton, d/d address in bags.
SODIUM SULPHIDE SOLID, 60/62%.—Spot, £10 5s. per ton d/d station in drums. Crystals—Spot, £7 10s. per ton d/d station in returnable casks.
SODIUM SULPHITE, PEA CRYSTALS.—Spot, £13 10s. per ton, d/d station in kegs. Commercial—Spot, £9 per ton, d/d station in bags.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—5d. to 6½d. per lb. Crude 60's 1s. 4d. to 1s. 6d. per gall. August/December.
ACID CRESYLIC 99/100.—2s. per gall. B.P., 4s. per gall. 97/99.—Refined, 2s. 3d. to 2s. 5d. per gall. Pale, 98%, 1s. 9d. to 1s. 11d. Dark, 1s. 4d. to 1s. 5d.
ANTHRACENE OIL, STRAINED (GREEN OIL).—4½d. to 4¾d. per gall.
BENZOLE.—Prices at works: Crude, 7½d. to 8½d. per gall.; Standard Motor, 1s. 3d. to 1s. 4d. per gall.; 90%, 1s. 4½d. to 1s. 5½d. per gall.; Pure, 1s. 7½d. to 1s. 8½d. per gall. (The above prices were operative from October 21 last).
TOLUOLE.—90%, 1s. 9d. to 1s. 10d. per gall. Pure, 1s. 11d. to 2s. per gall.
XYLOL.—1s. 8d. to 1s. 9d. per gall. Pure, about 1s. 11d. per gall.
CREOSOTE.—Standard specification, for Export, 5½d. to 6d. per gall. f.o.b.; for Home, 4d. per gall. d/d.
NAPHTHA.—Solvent, 90/160, 1s. 3d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 5d. per gall. Solvent, 90/190, 1s. to 1s. 2d. per gall.
NAPHTHALENE.—Purified Crystals, £11 11s. per ton.
PITCH.—Medium soft, 45s. per ton, f.o.b., according to district. Nominal.
PYRIDINE.—90/140, 3s. 6d. to 3s. 9d. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:—
ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.
ACID ANTHRANILIC.—6s. per lb. 100%.
ACID GAMMA.—Spot, 3s. 6d. per lb. 100% d/d buyer's works.
ACID H.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.
ACID NAPHTHIONIC.—1s. 2d. per lb. 100% d/d buyer's works.
ACID NEVILLE AND WINTHER.—Spot, 2s. 6d. per lb. 100% d/d buyer's works.
ACID SULPHANILIC.—Spot, 8½d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8½d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8½d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra, d/d buyer's works.
BENZIDINE BASE.—Spot, 2s. 6d. per lb. 100% d/d buyer's works.
BENZOIC ACID.—Spot, 1s. 8½d. per lb. d/d buyer's works.
o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.
m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.
p-CRESOL 34·5° C.—1s. 9d. per lb., in ton lots.
DICHLORANILINE.—2s. 5d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., packages extra d/d buyer's works.
DINITROBENZENE.—7½d. per lb.
DINITROCHLORBENZENE.—£74 per ton d/d.
DINITROTOLUENE.—48/50° C., 7d. per lb.; 66/68° C., 7½d. per lb.
DIPHENYLAMINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
a-NAPHTHOL.—Spot, 1s. 11d. per lb. d/d buyer's works.
B-NAPHTHOL.—Spot, £65 per ton in 1 ton lots, d/d buyer's works.
a-NAPHTHYLAMINE.—Spot, 1s. per lb. d/d buyer's works.
B-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 11d. per lb.
m-NITRANILINE.—Spot, 2s. 6d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 6½d. per lb., 5-cwt. lots, drums extra, d/d buyer's works.
NITRONAPHTHALENE.—9d. per lb.
R. SALT.—Spot, 2s. per lb. 100% d/d buyer's works.
SODIUM NAPHTHIONATE.—Spot, 1s. 6d. per lb. 100% d/d buyer's works.
o-TOLUIDINE.—Spot, 8d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 6d. per lb. d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 4d. per lb., 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £7 10s. to £8 per ton. Grey, £14 to £15 per ton. Liquor, 9d. per gall.
ACETONE.—£74 to £75 per ton.
CHARCOAL.—£6 5s. to £8 3s. per ton, according to grade and locality.
IRON LIQUOR.—10d. to 1s. 2d. per gall.
RED LIQUOR.—8d. to 10d. per gall.
WOOD CREOSOTE.—1s. 9d. per gall., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 11d. to 3s. 1d. per gall. Solvent, 4s. per gall.
WOOD TAR.—£4 5s. per ton.
BROWN SUGAR OF LEAD.—£37 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 2d. per lb., according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.
ARSENIC SULPHIDE, YELLOW.—1s. 8d. to 1s. 10d. per lb.
BARYTES.—£6 to £7 10s. per ton, according to quality.
CADMIUM SULPHIDE.—4s. 6d. to 5s. per lb.
CARBON BISULPHIDE.—£26 to £28 per ton, according to quantity; drums extra.
CARBON BLACK.—3½d. to 4 1/16d. per lb., ex wharf.
CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity. drums extra.
CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.
DIPHENYLGUANIDINE.—2s. 6d. per lb.
INDIARUBBER SUBSTITUTES, WHITE.—4½d. to 5½d. per lb.; Dark, 4½d. to 5d. per lb.
LITHOPONE, 30%.—£20 to £22 per ton.
SULPHUR.—£9 10s. to £13 per ton, according to quality.
SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.
SULPHUR PRECIP. B.P.—£55 to £60 per ton, according to quantity

VERMILION, PALE OR DEEP.—6s. 6d.–7s. per lb.
ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACETANILIDE.—1s. 3d. per lb. for 1-cwt. lots.
ACID, ACETIC, PURE, 80%.—£37 5s. per ton d/d address U.K. in casks.
ACID, ACETYL SALICYLIC.—2s. 7d. to 2s. 9d. per lb., according to quantity.
ACID, BENZOIC B.P.—2s. to 2s. 3d. per lb., for synthetic product, according to quantity. Solely ex Gum, 1s. 3d. to 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.
ACID, BORIC B.P.—Crystal, £31 per ton; powder, £32 per ton; For one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—1s. 1½d. per lb., less 5%.
ACID, GALLIC.—2s. 11d. per lb. for pure crystal, in cwt. lots.
ACID, MOLYBDIC.—5s. 3d. per lb. in ½-cwt. lots. Packages extra. Special prices for quantities and contracts.
ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.
ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 8d. per lb. Technical.—1s. to 1s. 2d. per lb.
ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
ACID, TARTARIC.—1s. 0½d. per lb., less 5%.
AMIDOL.—7s. 6d. to 11s. 3d. per lb., according to quantity.
AMMONIUM BENZOATE.—3s. 9d. per lb.
AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5-cwt. casks. Resublimated, 1s. per lb.
AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ½-cwt. lots. Packages extra. Special prices for quantities and contracts.
ARGENT. NITRAS, CRYSTALS.—1s. 1d. per oz.
ATROPHINE SULPHATE.—8s. per oz.
BARBITONE.—5s. 9d. to 6s. per lb.
BISMUTH CARBONATE.—7s. 6d. per lb.
BISMUTH CITRATE.—7s. 6d. per lb.
BISMUTH SALICYLATE.—7s. 3d. per lb.
BISMUTH SUBNITRATE.—6s. 6d. per lb.
BISMUTH NITRATE.—Cryst. 5s. per lb.
BISMUTH OXIDE.—9s. 6d. per lb.
BISMUTH SUBCHLORIDE.—8s. 9d per lb.
BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W. Qts. 11d. per lb. Liquor Bismuth B.P., in W. Qts., 1s. 2d. per lb.; 6 W. Qts., 11½d. per lb.; 12 W. Qts., 10d. per lb.; 36 W. Qts., 9½d. per lb.
BORAX B.P.—Crystal, £21 10s. per ton; powder, £22 per ton; for one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
BROMIDES.—Ammonium, 1s. 9d. per lb.; potassium, 1s. 4½d. per lb.; granular, 1s. 5d. per lb.; sodium, 1s. 7d. per lb. Prices for 1-cwt. lots.
CAFFEIN, PURE.—6s. 6d. per lb.
CAFFEIN CITRAS.—5s. per lb.
CALCIUM LACTATE.—B.P., 1s. to 1s. 4d. per lb., in 1-cwt. lots.
CAMPHOR.—Refined flowers, 2s. 10d. to 3s. per lb., according to quantity; also special contract prices.
CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.
EMETINE HYDROCHLORIDE.—58s. 6d. per oz.
EMETINE BISMUTH IODIDE.—33s. per oz.
EPHEDRINE, PURE.—12s. 6d. to 13s. 6d. per oz.
EPHEDRINE HYDROCHLORIDE.—9s .9d. to 10s. 6d. per oz.
EPHEDRINE SULPHATE.—9s. 9d. to 10s. 6d. per oz.
ERGOSTEROL.—2s. 6d. per gm.
ETHERS.—S.G. ·730—1s. to 1s. 1d. per lb., according to quantity; other gravities at proportionate prices.
FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.
GLUCOSE, MEDICINAL.—1s. 6d. to 2s. per lb. for large quantities.
HEXAMINE.—2s. 3d. to 2s. 6d. per lb.
HOMATROPINE HYDROBROMIDE.—27s. 6d. per oz.
HYDRASTINE HYDROCHLORIDE.—90s. per oz. for small quantities.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 3s. per gall.
HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.
HYPOPHOSPHITES.—Calcium, 2s. 11d. to 3s. 4d. per lb.; potassium, 3s. 2d. to 3s. 7d. per lb.; sodium, 3s. 1d. to 3s. 6d. per lb.; fo r28-lb. lots.
IRON AMMONIUM CITRATE.—B.P., 1s. 11d. per lb., for 28-lb. lots. Green, 2s. 6d. per lb., list price. U.S.P., 2s. 9d. per lb. list price.
IRON PERCHLORIDE.—18s. to 20s. per cwt. according to quantity.
IRON QUININE CITRATE.—B.P., 8¼d. to 8¾d. per oz., according to quantity.
MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.
MAGNESIUM OXIDE.—Light Commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.
MENTHOL.—A.B.R. recrystallised B.P., 13s. 6d. per lb. net; Synthetic, 8s. 6d. to 12s. per lb.; Synthetic detached crystals, 8s. 6d. to 10s. 3d. per lb., according to quantity; Liquid (95%), 9s. per lb.
MERCURIALS B.P.—Up to 1-cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.
METHYL SALICYLATE.—1s. 3d. to 1s. 5d per lb.
PARAFORMALDEHYDE.—1s. 8d. per lb.
PARALDEHYDE.—1s. 1d. per lb.
PHENACETIN.—3s. 9d. to 4s. 1d. per lb.
PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.
PILOCARPINE NITRATE.—10s. 6d. per oz.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—85s. 6d. per cwt., less 2½ per cent.
POTASSIUM CITRATE.—B.P., 1s. 9d. per lb. for 28-lb. lots.
POTASSIUM FERRICYANIDE.—1s. 7½d. per lb., in 125-lb. kegs.
POTASSIUM IODIDE.—16s. 8d. to 17s. 9d. per lb., as to quantity.
POTASSIUM METABISULPHITE.—50s. per cwt. d/dLondon, kegs free.
POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.
QUININE SULPHATE.—1s. 8d. per oz. for 1,000-oz. lots.
QUINOPHAN.—B.P.C., 14s. 6d. to 16s. 6d. per lb. for cwt. lots.
SACCHARIN.—43s. 6d. per lb.
SALICIN.—18s. 6d. per lb.
SODIUM BARBITONUM.—8s. 6d. to 9s. per lb. for 1-cwt. lots.
SODIUM BENZOATE B.P.—1s. 9d. per lb. for 1-cwt. lots.
SODIUM CITRATE.—B.P.C. 1911, 1s. 6d. per lb. B.P.C. 1923, and U.S.P., 1s. 10d. per lb. for 28-lb.. lots.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—85s. per cwt. net, ton lots, d/s of 5 cwt. Crystals, 2s. 6d. per cwt. extra.
SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 2d. per lb. Crystal, 1s. 11d. to 2s. 3d. per lb.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.
SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.
STRYCHNINE, ALKALOID CRYSTAL, 2s. per oz.; hydrochloride, 1s. 9½d. per oz.; nitrate, 1s. 8d. per oz.; sulphate, 1s. 9d. per oz., for 1,000-oz. quantities.
TARTAR EMETIC, B.P.—Crystal or powder, 1s. 9d. to 2s. per lb.
THYMOL.—Puriss, 7s. 3d. to 8s. per lb., according to quantity. Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.
AUBEPINE (EX ANETHOL).—9s. per lb.
AMYL ACETATE.—2s. 3d. per lb.
AMYL BUTYRATE.—4s. 9d. per lb.
AMYL CINNAMIC ALDEHYDE.—9s. per lb.
AMYL SALICYLATE.—2s. 6d. per lb.
ANETHOL (M.P. 21/22° C.).—6s. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—1s. 9d. per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 9d. per lb.
BENZYL BENZOATE.—2s. 4d. per lb.
CINNAMIC ALDEHYDE NATURAL.—11s. 9d. per lb.
COUMARIN.—12s. per lb.
CITRONELLOL.—6s. 6d. per lb.
CITRAL.—6s. 6d. per lb.
ETHYL CINNAMATE.—6s. 6d. per lb.
ETHYL PHTHALATE.—2s. 6d. per lb.
EUGENOL.—8s. 9d. per lb.
GERANIOL.—6s. to 10s. per lb.
HELIOTROPINE.—6s. per lb.
PHENYL ETHYL ACETATE.—10s. per lb.
PHENYL ETHYL ALCOHOL.—9s. per lb.
RHODINOL.—40s. per lb.
SAFROL—1s. 3d. per lb.

Prices of Essential Oils

ANISE OIL.—3s. 3d. per lb.
BERGAMOT OIL.—9s. 3d. per lb.
BOURBON GERANIUM OIL.—14s. per lb.
CAMPHOR OIL.—White, 1s. 9d. per lb.; Brown, 1s. 3d. per lb.
CASSIA OIL, 80/85%.—4s. 3d. per lb.
CINNAMON OIL LEAF.—5s. 6d. per oz.
CITRONELLA OIL.—Java, 2s. 2d. per lb., c.i.f. Pure Ceylon, 2s. 2d. per lb.
CLOVE OIL, 90/92%.—8s. 3d. per lb.
LAVENDER OIL.—Mont Blanc, 38/40%, 9s. per lb
LEMON OIL.—4s. per lb.
LEMONGRASS OIL.—3s. per lb.
PALMA ROSA OIL.—10s. per lb.
PEPPERMINT OIL.—Japanese, 4s. 6d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co. Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, January 29, 1931.

PRICES on the whole continue firm with quite a fair demand in general. There has also been quite a satisfactory volume of business for export.

General Chemicals

ACETONE.—In steady request at about £60 to £65 per ton, according to quantity.

ACETIC ACID.—Firm at £36 5s. to £38 5s. per ton for technical 80% and £37 5s. to £39 5s. for pure 80%, and in good demand.

ACID CITRIC.—Continues easy at about 1s. 2d. to 1s. 2¾d. per lb., less 5%.

ACID FORMIC.—£38 5s. per ton for 85% technical, with a little better demand.

ACID LACTIC.—Unchanged and firm at £41 to £42 per ton for the 50% by weight pale quality, and in steady request.

ACID OXALIC.—Firm at £30 7s. 6d. to £32 per ton, according to quantity.

ACID TARTARIC.—Continues firm at 1s. 0¼d. to 1s. 1¼d. per lb., less 5%, according to quantity.

ALUMINA SULPHATE.—Unchanged at £7 15s. to £8 5s. per ton, according to quantity, for the 17/18% iron free quality.

ARSENIC.—Continues unchanged and firm at about £19 to £19 10s. per ton.

CREAM OF TARTAR.—The improved demand continues and price remains steady at 87s. 6d. per cwt., ex warehouse London.

COPPER SULPHATE.—Unchanged at £22 to £22 10s. per ton, less 5%, free on rails London.

FORMALDEHYDE.—In steady demand at about £30 10s. to £31 per ton.

LEAD ACETATE.—Rather quiet at £34 15s. for white and £33 15s. for brown.

LEAD NITRATE.—Quiet at £29 10s. per ton.

LITHOPONE.—Continues steady at about £18 to £22 per ton.

POTASH BICHROMATE.—Firm at 4¼d. per lb., with the usual discounts for contracts.

PERMANGANATE OF POTASH NEEDLE CRYSTALS B.P.—Firm at 5½d. per lb., with a steady demand.

SODA BICHROMATE.—Firm at 3½d. per lb., with the usual discount for contracts.

SODA CHLORATE.—Continues very firm at about £26 10s. per ton and in good demand.

SODA HYPO SULPHITE COMMERCIAL CRYSTALS.—£8 10s. per ton; photographic crystals, £14 5s. per ton.

SODIUM SULPHIDE.—Unchanged and firm at £10 5s. to £11 5s. for solid with broken at £1 per ton extra, carriage paid.

TARTAR EMETIC.—Quiet at about 11d. per lb.

ZINC SULPHATE.—Steady at £11 to £11 10s. per ton.

Coal Tar Products

The market for coal tar products generally remains dull and uninteresting, and prices are without change.

MOTOR BENZOL.—Quoted at about 1s. 5½d. to 1s. 6½d. per gallon f.o.r.

SOLVENT NAPHTHA.—Remains at about 1s. 2¼d. to 1s. 3d. per gallon.

HEAVY NAPHTHA.—Worth about 1s. 1d. per gallon f.o.r.

CREOSOTE OIL.—Unchanged at about 3d. to 3½d. per gallon f.o.r. in the North, and at 4d. to 4½d. per gallon in London.

CRESYLIC ACID.—Remains at 1s. 8d. per gallon for the 98/100% quality, and at 1s. 6d. per gallon for the dark quality 95/97%.

NAPHTHALENES.—Quoted at £3 10s. to £3 15s. per ton for the firelighter quality, at about £4 to £4 5s. per ton for the 74/76 quality, and at about £5 per ton for the 76/78 quality.

PITCH.—Offered at 37s. 6d. to 42s. 6d. per ton, f.o.b. East Coast port.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—*Export.*—During the past week there has been a moderate demand for prompt shipment and the price continues in the neighbourhood of £7 to £7 2s. 6d. per ton, f.o.b. U.K. port in single bags, for neutral quality 20·6 per cent nitrogen. *Home.*—There has been a slightly better demand, probably due to the milder weather we have experienced in the last few days.

NITRATE OF SODA.—Schedule prices for January are being maintained, but there is not a great deal of business passing.

Latest Oil Prices

LONDON, January 28.—LINSEED OIL was steady, unchanged to 2s. 6d. per ton lower. Spot, ex mill, £17 10s.; February to April, £16 10s.; May-August, £16 12s. 6d.; September-December, £17 5s., naked. RAPE OIL was inactive. Crude extracted, £29; technical refined, £30 10s., naked, ex wharf. COTTON OIL was steadier. Egyptian, crude, £18; refined common edible, £21 10s.; deodorised, £23 10s., naked, ex mill. TURPENTINE was quiet. American, spot, 35s. 3d.; February-April, 35s. 9d. Russian, spot, 32s. 9d. per cwt.

HULL.—LINSEED OIL, naked, closed for spot at £16 15s.; January £16 15s.; February-April, £16 5s.; May-August, £16 5s.; September-December, £17. Baltic, spot, unquoted. COTTON OIL, naked. Egyptian, crude, spot £17 10s.; edible, refined, spot, £20; technical, spot, £19 15s.; deodorised, £22 CASTOR OIL —Spot, 39s. 6d.; firsts, 34s. 6d.; seconds, 32s. 6d. PALM KERNEL OIL.—Crude, naked, 5½ per cent., £24. GROUNDNUT OIL.—Crushed-extracted, spot, £23; deodorised, £27. SOYA OIL.—Extracted-crushed, spot, £21 10s.; deodorised, £25. RAPE OIL.—Crushed-extracted, spot, £28 10s.; refined, spot, £30 10s. per ton. COD OIL, 18s. 6d. per cwt. TURPENTINE, 37s. 9d. per cwt.

South Wales By-Products

THERE is very little change to report in South Wales by-product activities. Pitch has a slightly better call, and there are indications of a revival of buying on the part of patent fuel makers and other big users. There is no change in quotations. Road tar has a fair call, with values unchanged round about 13s. per 40-gallon barrel. Refined tars have a steady, if moderate call, with values for coke-oven and gasworks tar unchanged. Naphthas have only a small, sporadic call, quotations for solvent and heavy being unchanged. Creosote remains weak, but motor benzol is in good demand. Patent fuel and coke exports are unsatisfactory, although there is an improvement. Patent fuel prices, for export, are as follows:—21s. to 21s. 6d., ex ship Cardiff; 20s., ex ship Swansea and Newport. Coke prices are: Best foundry, 34s. to 36s. 6d.; good foundry, 22s. 6d. to 25s.; furnace, 17s. 6d. to 18s.

Scottish Coal Tar Products

CONSIDERABLE business has been placed in creosote oil, both specification and gas works ordinary, but values are unchanged meantime although there is a firmer tendency. Other products remain inactive with prices easy.

Cresylic Acid.—Owing to the lack of new business values show a further drop. Pale, 99/100%, 1s. 6½d. to 1s. 7½d. per gallon; pale, 97/99%, 1s. 5½d. to 1s. 6½d. per gallon; dark, 97/99%, 1s. 4½d. to 1s. 5½d. per gallon; high boiling is unaltered, however, at 1s. 7d. to 1s. 9d. per gallon; all f.o.r. works.

Carbolic Sixties.—Prices remain nominal at about 1s. 8d. per gallon for best qualities.

Creosote Oil.—Quotations remain steady. Specification oil, 2½d. to 2¾d. per gallon; gas works ordinary, 3¼d. to 3¾d. per gallon; washed oil, 3d. to 3¼d. per gallon; all ex works in bulk.

Coal Tar Pitch.—Orders continue scarce but values are unchanged. Export quotations are about 42s. 6d. to 45s. per ton f.a.s. Glasgow and home, about 45s. per ton, ex works.

Blast Furnace Pitch.—Dull with controlled prices at 30s. per ton f.o.r. works for home trade, and 35s. per ton f.a.s. Glasgow for export.

Refined Coal Tar.—Makers' prices have been reduced to 2¾d. to 3d. per gallon f.o.r. works in buyers' barrels.

Blast Furnace Tar.—Controlled price remains at 2¾d. per gallon.

Crude Naphtha.—Supplies are scarce and value is steady at 4¼d. to 4½d. per gallon.

Water White Products.—Business is spasmodic. Motor benzol is 1s. 4d. to 1s. 4½d. per gallon; 90/160 solvent, 1s. 2½d. to 1s. 3½d. per gallon; 90/190 heavy solvent, 1s. 0½d. to 1s. 1d. per gallon, all f.o.r. makers' works.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

AFRICA.—The Public Health Department, Loanda, is calling for tenders, to be presented in Loanda by February 6, for the supply of medicaments and laboratory supplies for the year 1931-32. (Ref. No. F.X. 1001.)

BRAZIL.—A firm of commission agents in Rio de Janeiro wishes to obtain the representation of British manufacturers of industrial chemicals. (Ref. No. 75.)

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.*

Glasgow, January 27, 1931.

THERE is a decided improvement generally in the Scottish heavy chemical market and a more hopeful outlook for future business.

Industrial Chemicals

ACETONE.—B.G.S.—£60 to £63 per ton, ex wharf, according to quantity.

ACID, ACETIC.—Prices ruling are as follows: glacial, 98/100%, £47 to £58 per ton; pure, £37 5s. per ton; technical, 80%, £36 5s., delivered in minimum lots of 1 ton.

ACID, BORIC.—Granulated commercial, £22 per ton; crystals, £23; B.P. crystals, £31 per ton; B.P. powder, £32 per ton, in 1-cwt. bags, delivered free Great Britain in one-ton lots upwards.

ACID, HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. per carboy, ex works, full wagon loads.

ACID, NITRIC, 80° QUALITY.—£23 per ton, ex station, full truck loads.

ACID, OXALIC.—98/100%.—On offer at the same price, viz.: 3¼d. per lb., ex store. On offer from the Continent at 3½d. per lb., ex wharf.

ACID, SULPHURIC.—£3 7s. 6d. per ton, ex works, for 144° quality; £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID, TARTARIC, B.P. CRYSTALS.—Quoted 11¾d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 1s. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted at round about £8 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton., c.i.f. U.K. ports. Crystal meal, about 2s. 6d. per ton less.

AMMONIA ANHYDROUS.—Quoted 10¼d. per lb., containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton. Powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 80°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Spot material obtainable at round about £28 per ton, ex wharf. On offer for shipment from China at about £27 per ton, c.i.f. U.K.

ARSENIC, WHITE POWDERED.—Quoted £22 10s. per ton, ex wharf, prompt shipment from mines. Spot material still on offer at £22 15s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £9 10s. per ton, c.i.f. U.K. ports. For Continental materials our price would be £8 10s. per ton, f.o.b. Antwerp or Rotterdam.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 15s. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 15s. to £5 5s. per ton, according to quantity and point of delivery. Continental material on offer at £4 15s. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—At about £3 15s. per ton, f.o.r. works, or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Now quoted £33 per ton, ex store. Continental on offer at about £32 per ton, ex wharf.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 per ton, ex wharf.

LEAD, RED.—Price now £34 per ton, delivered buyers' works.

LEAD, WHITE.—Quoted £46 per ton, carriage paid.

LEAD, ACETATE.—White crystals quoted round about £38 to £39 per ton ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE.—GROUND CALCINED.—Quoted £9 7s. 6d. per ton, ex store.

METHYLATED SPIRIT.—Industrial quality 64 o.p. quoted 1s. 8d. per gallon less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4¼d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—Spot material on offer, £25 10s. per ton ex store. Offered from the Continent at £24 15s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¼/100% POWDER.—Quoted £25 per ton ex store; crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £20 17s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 7d. per lb. ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb. ex wharf.

SODA CAUSTIC.—Powdered 98/99%, £17 10s. per ton in drums, £18 15s. in casks. Solid 76/77% £14 10s. per ton in drums, £14 12s. 6d. per ton for 70/72% in drums, all carriage paid, buyer's station, minimum four-ton lots. For contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3¾d. per lb., delivered buyer's premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station; powdered or pea quality, 7s. 6d. per ton extra. Light soda ash, £7 13s. per ton, ex quay, minimum four-ton lots, with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 2s. 6d. per ton, ex station, minimum four-ton lots. Pea crystals on offer at £15 per ton, ex station, minimum four-ton lots.

SODIUM NITRATE.—Chilean producers now offer at £9 18s. per ton, carriage paid, buyer's sidings, minimum six-ton lots.

SODIUM PRUSSIATE.—Quoted 5¼d. per lb., ex store. On offer at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Price, 60s. per ton, ex works; 65s. per ton, delivered for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption: solid 61/62%, £10 per ton; broken, 60/62%, £11 per ton; crystals 30/32%, £8 2s. 6d. per ton, delivered buyers' works on contract, minimum four-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £9 5s. per ton; ground American, £9 per ton, ex store.

ZINC CHLORIDE 98%.—British material now offered at round about £19 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Chemical Supply Co.'s 25th Year

THIS year the Chemical Supply Co., Ltd., of 7–8, Idol Lane, Eastcheap, London, E.C.3, celebrate their 25th anniversary, and to mark the occasion have decided to form a technical service library, consisting of books and articles on the production and application of cellulose lacquers collected from the best sources of information throughout the world. Already a considerable stock of books and periodicals has been collected, and these, with expert advice, are available for the use of clients of the firm. Particulars of the scheme are embodied in a very useful desk diary and memoranda pad, which the firm issues with its silver jubilee year greetings.

Marking of Imported Fertilisers

THE Board of Trade announce that in pursuance of Section 7 of the Merchandise Marks Act, 1926, a draft Order in Council was laid before Parliament on January 21 requiring fertilisers and feeding stuffs of the following descriptions: (a) Bone meal and bone flour, whether raw, degreased or degelatinised; (b) hoof meal, horn meal and mixtures thereof; (c) meat meal, meat and bone meal and carcase meal; and (d) dried blood, whether ground or unground; to bear an indication of origin on importation into, and on sale or exposure for sale in, the United Kingdom.

The Potash Notebook, 1931

THE Agricultural Department of the United Potash Co., Ltd., of Fenton House, 112, Fenchurch Street, London, E.C.3, have issued a pocket notebook that should be extremely useful to all interested in potash. It contains tables of the composition of potash salts, balanced on manurial dressings per acre for different crops, conversion tables for merchants, farmers, etc., and similar technical and practical information, while there is ample space for notes and memoranda. Altogether a very handy pocket companion.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, January 29, 1931.

Although the majority of lines of heavy chemicals on this market during the past week have held steady to firm, one or two instances of further slight reaction have been in evidence. Trading conditions have been patchy for the most part, for whilst some fair-sized orders have been reported they have been pretty well isolated instances, most sellers having experienced relatively quiet conditions. The lock-out in the weaving section of the cotton trade continues to exert a depressing influence and until the trouble is disposed of—and of this at the moment there is no sign—there can be little hope of better conditions in the chemical trade in this part of the country.

Heavy Chemicals

Bichromate of soda this week has attracted moderate attention, and values have been well held on the basis of 3½d. per lb., less discounts of 1 to 2½ per cent., according to quantity. There has been only a comparatively quiet movement in the case of chlorate of soda, with current offers of this material at about £26 10s. per ton. Phosphate of soda has been on the slow side and prices now range from £9 10s. to £10 per ton for the dibasic sort. Caustic soda is moving off in fair quantities, as before chiefly against contracts, these being quoted at from £12 15s. to £14 per ton, according to quality. Hyposulphite of soda has been a quiet section but there has been little alteration in prices, the commercial grade offering at about £9 5s. per ton and the photographic at £15. There is a fair demand about for bicarbonate of soda, which keeps firm at £10 10s. per ton, in contracts. Prussiate of soda meets with a moderate inquiry and quotations are steady at from 4¾d. to 5¼d. per lb., according to quantity. There has been little change in the general position of alkali, and prices are maintained at round £6 per ton. The demand for saltcake this week has been on a relatively limited scale, but values keep up in the neighbourhood of £3 per ton. Sulphide of sodium is in quiet request, with the commercial quality on offer at round £8 10s. per ton and the 60-65 per cent. concentrated material quoted at £10.

A quietly steady demand has been reported this week in respect of yellow prussiate of potash, quotations for which are firm at from 6¾d. to 7¼d. per lb., according to quantity. There is not a great deal of business passing in permanganate of potash, but prices keep up at about 5½d. per lb. for the B.P. grade and 5¼d. for the commercial material. With regard to carbonate of potash, inquiry has been of moderate extent, with supplies on offer at about £25 per ton. Caustic potash is attracting moderate buying interest and values are reasonably steady at the moment at £28 10s. per ton. Chlorate of potash is still on the slow side, but prices are unchanged compared with a week ago at £27 10s. per ton. Bichromate of potash is in moderate request on the basis of 4¼d. per lb.

Only a quiet business in sulphate of copper has been put through this week, but there has been no change in values, these being at round £21 per ton, f.o.b. Arsenic maintains a steady front, current offers of the white powdered, Cornish material, ranging from £19 to £19 10s.s per ton at the mines. A slow business is passing in the acetates of lime, with the grey quality quoted at round £13 15s. per ton, and the brown at £7 5s. There is a quiet demand about for the acetates of lead at the lower range, white being quoted at £33 17s. 6d. to £33 15s. per ton, according to quantity, and brown at from £33 10s. to £34 15s. Nitrate of lead continues on offer at about £29 per ton.

Acids and Tar Products

Only a limited business is being done in oxalic acid, which, however, is unchanged at about £1 12s. per cwt., ex store. Tartaric acid is in quiet call at 11½d. per lb., with citric acid in a somewhat similar position at 1s. 2¼d. Acetic acid is in moderate demand and prices in this section are well held at £51 per ton for the glacial quality and about £37 for the 80 per cent. commercial

Business in the by-products market has been on quiet lines, with pitch selling at round 40s. per ton, f.o.b., and creosote oil at from 3¼d. to 4¼d. per gallon, naked. Carbolic acid is no stronger than before, with crystals easily obtainable at about 5¼d. per lb., f.o.b., and crude 60's at round 1s. 3d. per gallon, naked. Solvent naphtha is only in moderate demand at about 1s. 2d. per gallon, naked.

Company News

Gas Light and Coke Co., Ltd.—A dividend at the rate of £5 12s. per cent. is recommended on the ordinary stock for the half-year ended December 31, carrying forward £122,055 after payment of the fixed dividends.

South Metropolitan Gas Co.—A final dividend for the past year is recommended by the directors, subject to audit, on the ordinary stock at the rate of 6¼ per cent. per annum, less the interim dividend of 2½ per cent. paid in September last.

New Transvaal Chemical Co.—For the year to June 30 last, the report states that the balance standing to the credit of profit and loss account, including £5,090 brought forward, is £70,674. After payment of directors' fees and dividend of 12½ per cent. on the ordinary shares, there is a balance to be carried forward of £14,794.

Veno Drug Co. (1925), Ltd.—The directors have decided to defer consideration of the payment of a further dividend upon the 300,000 £1 8 per cent. cumulative preference shares and the 275,000 £1 12 per cent. cumulative preferred ordinary shares, payable on January 31, until they have had an opportunity of considering the accounts for the year ending March 31, 1931.

Fairy Dyes, Ltd.—The profits for the year to November 30, 1930, including interests and transfer fees received, amount to £22,070, to which is added balance from last year, £3,521, making £25,591. The directors recommend a dividend at the rate of 12½ per cent. on the ordinary shares, participating dividend of 2½ per cent. per annum on 7½ per cent. cumulative preference shares, to write off balance of preliminary expenses, £2,750, and to carry to reserve fund £5,000, leaving a balance of £1,930 to be carried forward.

New Companies Registered

BARRETT PROPRIETARIES, LTD., Old Mill Street, Brookhouse, Blackburn. Registered January 22. Nominal capital, £20,000 in £1 shares. Chemists, druggists, drysalters, oil and colour men, patent medicine vendors, etc. Directors: Sir Henry R. Hornby, C. B. Petre, N. R. Smith, A. Haworth, C. Barrett, Alice Jackson.

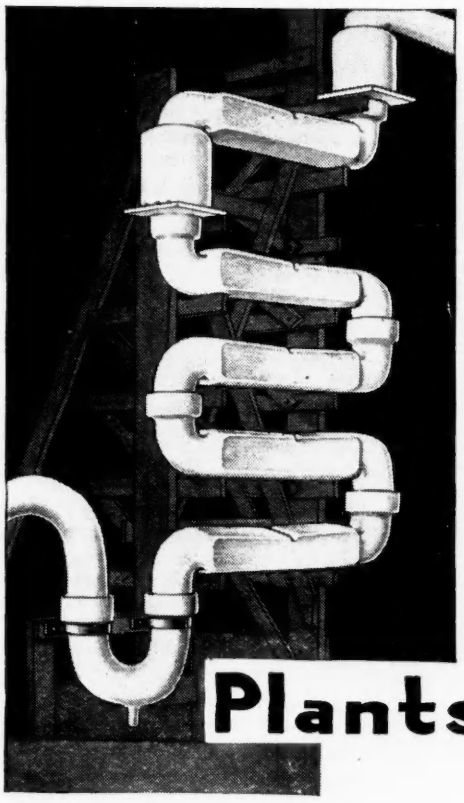
CORROSION-RESISTING METALS, LTD., Providence Street, Cradley Heath, Staffs.—Registered January 14. Nominal capital, £3,000 in £1 shares. Manufacturers of metal goods of every description, brass and iron founders, stainless steel and chromium plate workers, etc. Directors: J. Hathaway and G. H. R. H. Powell.

DAVIS GARDNER, LTD., Mark Lane Station Buildings, London, E.C.3. Registered January 20. Nominal capital, £300 in £1 shares. Manufacturers, exporters and importers of waterproofing and water-resisting preparations, compounds, emulsions and concentrates of all kinds; chemists, druggists, drysalters, oil and colour men, etc. Directors: C. S. Townsend, H. J. Coombes.

PROGRESS LABORATORIES, LTD.—Registered January 26. Nominal capital £1,000 in £1 shares. Manufacturers of soaps, and soap and bleaching powders; manufacturers of and dealers in oils and oleaginous and saponaceous substances, pharmaceutical, manufacturing and general chemists and druggists, etc. A subscriber: R. S. Howarth, Glen Villa, Bury, and Bolton Road, Radcliffe, Lancs.

RAINEY AND CO. (GLASGOW), LTD., Riverbank Chemical Works, Rutherglen. Registered January 19, in Edinburgh. Nominal capital, £200 in £1 shares. Manufacturers of and dealers in substances or preparations having a bleaching, sanitary or cleansing nature, compounds, mixtures, etc. Directors: D. Rainey, R. Inglis.

THOMPSON, L'HOSPIED AND CO., LTD. Registered January 21. Nominal capital, £6,000 in £1 shares. Buyers, manufacturers, importers and exporters of and dealers in chemicals of all kinds, designers and builders of works and plant, chemical engineers, manufacturing chemists, etc. Directors: C. H. Thompson, Mount Battenhall, Worcester; Mrs. E. Thompson.



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The plant that speeds up production and effects economies.

SYSTEM OF HYDROCHLORIC ACID ABSORPTION.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

HESTERINE, LTD., 8, Breakspear Road, Brockley, manufacturers of solvents. (C.C., 31/1/31.) £13 1s. 6d. December 5.

LEWIS, Frank Edward, 120, Knox Road, Portsmouth, chemical manufacturer. (C.C., 31/1/31.) £47 12s. 11d. December 11.

Receiverships

BRITISH SULPHIDES SMELTING CO., LTD. (R., 31/1/31.) H. G. Ash, F.C.A., of Finsbury Court, Finsbury Pavement, E.C., was appointed receiver by Order of Court dated October 29, 1930. (Notice filed January 12, 1931.)

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

ACE OF SPADES PETROLEUM CO., LTD., Hounslow. (M., 31/1/31.) Registered January 19, £600 mortgage, to A. S. Ruston, 193, High Street, Brentford, solicitor; charged on land at Great West Road, Sutton, Heston. *£14,000. October 16, 1929.

AUSTRALIAN COMMONWEALTH FUELS AND OILS, LTD., London, S.W. (M., 31/1/31.) Registered January 19, £1,500 debenture, to H. H. Hardman, 10, Norfolk Street, W.C., solicitor; charged on land in parish of Maryvale, County of Bulu Bulu, Victoria. *Nil. January 10, 1930.

COLOUR PHOTOGRAPHS (BRITISH AND FOREIGN), LTD., London, N.W. (M., 31/1/31.) Registered January 14, charge, to Westminster Bank, Ltd., securing all moneys due or to become due to the Bank; charged on properties in Victoria Road, Willesden, etc. *Nil. December 5, 1929.

CUBES, LTD., Liverpool, manufacturing chemists. (M., 31/1/31.) Registered January 19, £200 debenture, to Mrs. C. M. Wilson, 1, Percy Street, Liverpool; general charge.

HIGHWAYS COLLOIDAL, LTD., London, W., chemists. (M., 31/1/31.) Registered January 5, £1,500 mortgage and £2,810 debenture, to J. Hargreaves, 70, Victoria Street, S.W.; charged on land and buildings in Abbey Road, Twyford (Middlesex), etc., and general charge. *£5,000. March 25, 1929.

HIGHWAYS COLLOIDAL, LTD., London, W., chemists. (M., 31/1/31.) Registered January 6, 2nd debenture collaterally securing £1,500 and in addition sums not exceeding £2,500 as shall become due to the holder, J. Hargreaves, 70, Victoria Street, S.W.; general charge (excluding certain shares). *£5,000.

INSTITUTE OF COMMERCIAL RESEARCH, LTD., London, E.C. (M., 31/1/31.) Registered January 16, £300 debenture, to G. P. Harben, 68A, Queen's Gate, S.W.; general charge. *——. December 4, 1929.

NORTH BRITISH ARTIFICIAL SILK, LTD., London, E.C. (M., 31/1/31.) Registered January 12, £40,000 debenture, to Williams Deacon's Bank, Ltd.; general charge (other than property in Scotland, etc.). *Nil. October 23, 1930.

PHOTOMATON PARENT CORPORATION, LTD., London, E.C. (M., 31/1/31.) Registered January 13, £450 debentures, part of £400,000; general charge. *——. December 31, 1929.

UNITED PETROLEUM TRUST, LTD., Hampton Hill. (M., 31/1/31.) Registered January 12, £650 debentures; general charge; also registered January 12, £50 debenture, to A. A. Romain, 52, Baker Street, W., solicitor; general charge.

Satisfactions

BRITISH CELANESE, LTD., London, W. (M.S., 31/1/31.) Satisfaction registered January 12, £50,320, part of amount registered August 24, 1922, and July 6, 1923.

THORNTON AND ROSS, LTD., Milnsbridge, manufacturing chemists. (M.S., 31/1/31.) Satisfaction registered January 13, £744, registered April 3, 1926.

WALTON (JOHN) OF COLLYHURST, LTD., bleachers, etc. (M.S., 31/1/31.) Satisfaction registered January 14, £15,000, registered October 23, 1913.

WARMINSTER GAS AND COKE CO., LTD. (M.S., 31/1/31.) Satisfaction registered January 9, £3,200, registered November 12, 1915, to June 23, 1922.

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Company Winding Up

ANGLO-GERMAN PHARMACEUTICAL PRODUCTS CORPORATION, LTD. (C.W.U., 31/1/31.) Winding-up order, January 19.

Companies Winding Up Voluntarily

GYPSUM AND PLASTER PRODUCTS CO., LTD. (C.W.U.V., 31/1/31.) By reason of its liabilities, January 20. F. T. Smith, of Premier House, 150, Southampton Row, London, W.C.1, Chartered Accountant, appointed as liquidator.

HYDRA-OXYGEN SMOKELESS COMBUSTION CORPORATION, LTD. (C.W.U.V., 31/1/31.) Creditors' claims by March 15 to Roy Jack Climpson, of 9, Copthall Avenue, London, E.C.2, Chartered Accountant, the liquidator of the company.

KAYE'S RUBBER LATEX PROCESS, LTD. (C.W.U.V., 31/1/31.) (Members' voluntary winding-up.) Creditors' claims to A. H. Cheney, 27–28, Finsbury Square, Londo , E.C.2, liquidator, by February 11.

KOHINOOR COPRA OIL AND TRADING CO., LTD. (C.W.U.V., 31/1/31.) (Members voluntary winding-up.) By special resolution, January 23. T. H. Fraser, Chartered Accountant, of 11A, Hart Street, London, W.C.1, appointed as liquidator.

NATIONAL FUEL OIL CO. (1921), LTD. (C.W.U.V., 31/1/31.) By reason of its liabilities, January 22. Herbert Smith, solicitor, 60, Mark Lane, E.C.3, nominated as liquidator, and confirmed by meeting of creditors.

RALUCO, LTD. (C.W.U.V., 31/1/31.) By special resolution, January 19. F. J. B. Gardner, of 94, Old Broad Street, London, E.C.2, Chartered Accountant, appointed as liquidator. (All creditors have been, or will be, paid in full.)

ZOCUS PAINT CO., LTD. (C.W.U.V., 31/1/31.) By special resolution, January 22, for purpose of reconstruction. Robert Jardine, C.A., of 20, Bucklersbury, London, E.C., appointed as liquidator.

Partnership Dissolved

KWELLIT CO. (Harold Ewart MITCHELL and James PICKSTONE), manufacturers of chemical fire extinguishers, Bridgewater Chambers, 6, Brown Street, Manchester, by mutual consent, December 12, 1930, so far as concerns J. Pickstone, who retires. Debts received and paid by H. E. Mitchell, who will continue the business.

Tariff Change

CHINA.—The following new duties came into force on January 1: Soda ash, 0·77 gold units per picul (formerly 0·34); bicarbonate of soda, in bulk, 1·30 (formerly 0·76); caustic soda, 1·50 (0·95); soda, crystal, 0·85 (0·42); concentrated crystal soda, 2·00 (0·87); silicate of soda, 1·00 (0·53); sulphide of soda, 1·10 (0·68); mangrove bark, 0·24 (0·57); chemicals and chemical compounds, not otherwise provided for, 12½ per cent. *ad val.* (7½ or 12½ per cent.); medicines, drugs, and medicinal compounds and preparations, 15 per cent. *ad val.* (12½ per cent.).